

**Office Automation
Service Opportunities
Data Book**

January 1984



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INPUT



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OFFICE AUTOMATION SERVICE OPPORTUNITIES DATA BOOK

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I INTRODUCTION

I INTRODUCTION

A. OVERVIEW

- This report is the result of a study authorized verbally on December 16, 1983, by W.D. Trotter, Division Manager of AT&T, 95 Madison Avenue, Room 52-2E11, Morristown, New Jersey 07960. At the time of writing this report the final proposed contract (dated December 21, 1983) had not been received by INPUT.
- The data provided comes from INPUT's service files, the library of company data held by INPUT, and relevant studies accomplished in the last 18 months. This factual data is supplemented by INPUT's own subjective opinion on many issues, which is the result of INPUT's involvement in field service issues and office automation markets since 1979.
- The "Strategic Link" chapter summarizes INPUT's views on the opportunity that AT&T has in the office automation market in its broadest perspective. The recommendations concern AT&T specifically and are not applicable to any other company. In particular INPUT believes that AT&T has a communications market image equivalent to IBM's data processing/computer market image. This image can be parlayed into a market position (revenues, market share, etc.) through accurate product and service positioning where success depends less on the competitive strength of the product/service offered and more on the AT&T name.

- Nevertheless, it is important that AT&T demonstrate leadership in the marketplace because of its image, and this means having a detailed and comprehensive conceptual understanding of what office automation means to Corporate America:
 - Overall, corporation-wide system design needed.
 - Current elements of office automation available and entry points.
 - Conversion milestones and boilerplate blueprint for implementation.

B. SCOPE

- The purpose of this report is therefore to provide an in-depth view of the service requirements and opportunities in the office automation sector of the computer systems industry. The product lines examined are as follows:
 - Word processing systems.
 - Personal computers, workstations, and intelligent terminals.
 - Commercial application minicomputers.
 - Network-based services.
 - Terminals.
 - Peripherals.
 - Software products.

II OFFICE AUTOMATION SERVICE OPPORTUNITIES

!! OFFICE AUTOMATION SERVICE OPPORTUNITIES

A. INTRODUCTION

- All office products share one common characteristic - they are shipped in high volumes. Maintenance can therefore become a very profitable or very costly enterprise; poor decisions made during product development can have disastrous results, and engineering changes can become extremely expensive and must be tightly controlled.
- It is therefore necessary to maintain an accurate data base on shipped equipment. The vendor's service and support management must have adequate authority to insure shipped products perform as forecast. There are several risks for independent organizations servicing products in the office product sector. Product performance, competition, availability and cost of spares, product life cycle, and engineering change policies. The overall rewards, however, make taking such risks worthwhile.
- Another factor separating this marketplace from the rest of the systems business is the level of user sophistication. In many cases, this is the user's first involvement with computers or high technology equipment. It is also an area of high employee turnover. In the past, business colleges provided a relatively high level of knowledge of office products. A similar resource for the new generation of products is not yet available. This should improve in the near future as many organizations are gearing up for that purpose.

- The competition for servicing this marketplace is constantly increasing. There are also several independent agents in local areas beginning to increase their roles in this sector of the business. Success will depend on the quality and speed of service provided to the users of office products.
- Unlike with their personal computers, IBM encourages end-user service on their word processing product line. These products are not marketed through product centers but are included in their normal sales activities. The success of capturing a significant portion of this business is questionable.
- Along with IBM PCs, equipment manufactured by corporations like CPT and NBI offer excellent maintenance opportunities. They are normally serviced by the distributor, and the quality of service varies enormously by location. By offering a professional and consistent nationwide service organization, the revenues involved will more than justify the initial costs.
- Several procedural questions must be dealt with prior to setting up such an organization:
 - Is AT&T going to work in cooperation with vendors or remain independent?
 - Which specific vendor products will be maintained and which will not?
 - Will AT&T also support the software involved?
 - How many locations are involved?
 - Will AT&T offer a complete line of services, i.e., on-site, mail-in and carry-in?

- The following are examples of the advantages to working with vendor cooperation in the office product area of the systems business:
 - Training is provided by the vendor lower than normal costs (e.g., \$600 per class week, plus living expenses).
 - Plant support services are provided.
 - Spare parts are available at 10% to 20% over cost (or one-third of retail).
 - There is compensation for installing engineering changes.
 - Documentation is available concerning latest maintenance information and software releases.
 - There is defective unit replacement (free under warranty).
- These items drastically reduce the costs of providing maintenance. Throughout this report INPUT will calculate manpower estimates based on the assumption that the above services will be provided when servicing products in a cooperative manner with the vendors involved.

B. ORGANIZATIONAL SETUP PARAMETERS

- In order to estimate setup and organizational costs for a service organization handling office products, some existing standard industry parameters were used. These standards may vary from actual costs depending upon the level of the organization's experience and expertise.

- The standards used are as follows:

<u>Education Development</u>	<u>Development Cost</u>		<u>Course</u>
Lecture/lab method	8 hours	to	1 hour
Programmed instruction	72 hours	to	1 hour
Computer-assisted instruction	110 hours	to	1 hour
Video production	85 hours	to	1 hour
Animation	235 hours	to	1 hour

1. LOGISTICS

- Spares purchased from vendor - three times burdened manufacturing cost for each spare.
- Sparing units level - 5% to 7% of installed base for each element of the system being maintained.
- o Number of spare kits needed - 5% to 7% of installed units.

2. MANAGEMENT RATIOS

- Operational service organizations determine when they need to have the next level of management by the following parameters:
 - Fourteen field engineers per manager.
 - Five managers per region.
 - Three regions per operations manager.

3. DOCUMENTATION

- Technical documentation: development - eight hours, finished - one page.

4. ORGANIZATIONAL BLUEPRINT

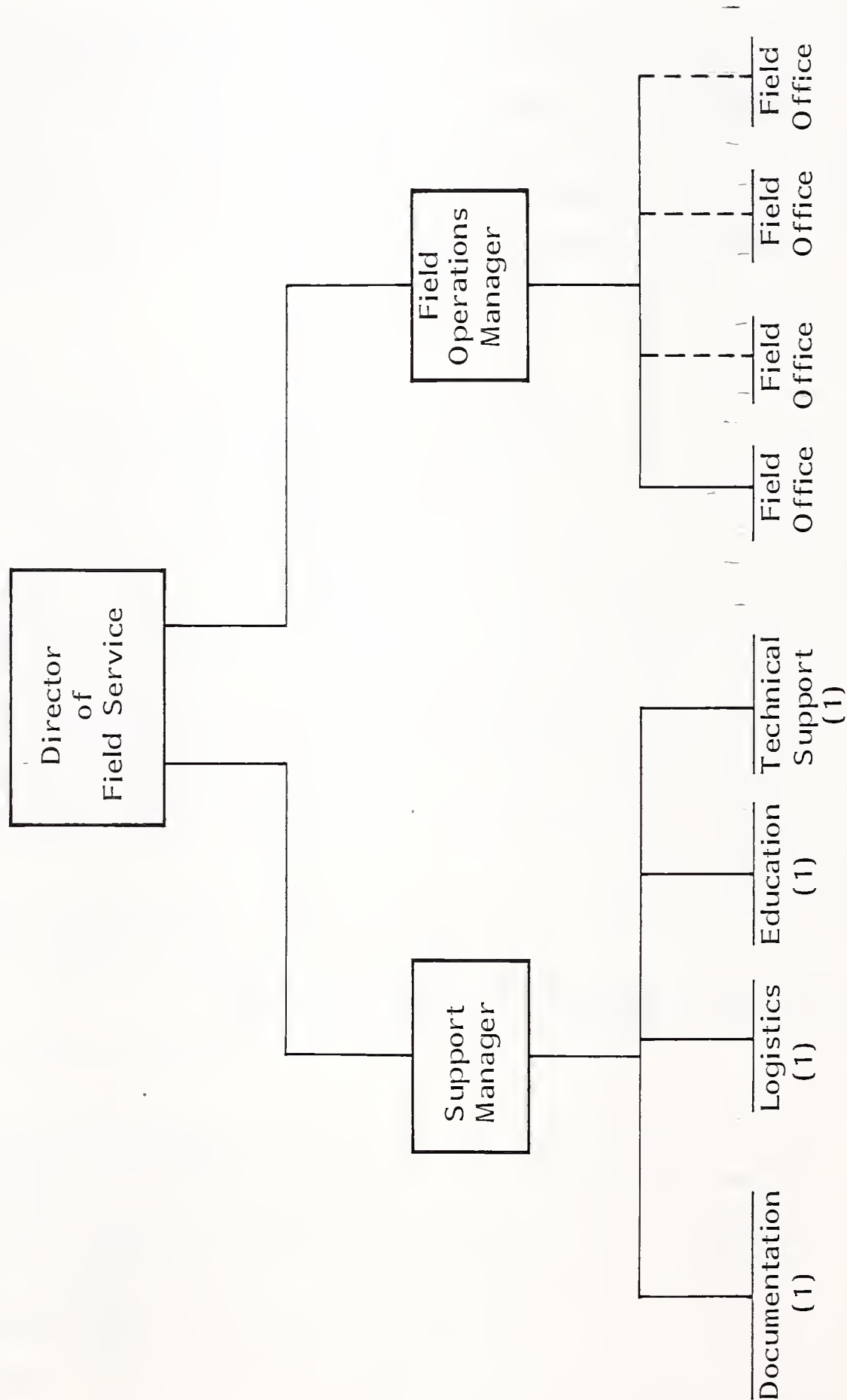
- Exhibit II-1 shows the bare minimum manpower needed to start a service organization, regardless of the products involved. A key to success is the experience of the initial staff (failure in any one area can have disastrous consequences). The director of field service must have had extensive experience in the position before and must have a solid financial performance history in field service.
- The support and operations manager positions are equally as important but require more specialized knowledge and experience. The number of field offices vary, but a minimum of three to four field engineers per location is required (because of illness, training, and vacation needs).
- If the service organization works in cooperation with vendors, the headquarters staff can be held to a minimum. If it acts independently, this area will require many talented and creative individuals and will create large initial operating costs. Throughout this report INPUT will show the approximate manpower required in these areas based upon current operating philosophies.

C. SUPPORT SERVICE REVENUE (1982-1987)

- INPUT has estimated the field service support revenues for hardware and software broken down into finer detail than that required by the study and including maintenance revenue, education revenue, over-the-counter parts, sales, and software installation fees. Note that hardware installation fees are carried as a part of maintenance revenue and are equal to one month's rental (industry-wide standard and therefore easy to calculate when doing a revenue plan based on shipments).

EXHIBIT II-1

MINIMUM START-UP ORGANIZATION



- Exhibits II-2 and II-3 provide the INPUT estimates for revenues from these sources for 13 categories of equipment in 1982 and 1987. The total hardware service revenue in 1982 was \$9.4 billion and is expected to rise to \$24.2 billion by 1987. This, of course, includes all service revenue from all hardware shipments in the U.S. The software service revenues, where applicable to equipment, have been included in the equipment categories.
- Appendix A provides a breakdown of the shipments, software sales, and service revenue produced by the various product markets and a forecast of the growth to 1987.
- One major consideration in the evaluation of a marketplace opportunity in office automation services is the question of how much of the total revenue produced is captive (i.e., unavailable for whatever reason) and how much is real potential revenue? This is an extremely difficult question to answer because much depends on the marketing agreements that AT&T is able (or willing) to enter into with the various product vendors in each of the office automation markets targeted. Nevertheless, INPUT has made an estimate of the available revenue opportunities in each market in Exhibit II-4. The revenues indicated apply to third-party maintenance (TPM) opportunities only and ignore the revenues available from single-source maintenance (SSM) and network consulting, which are discussed later.
- Available revenues listed in Exhibit II-4 are theoretically available to an outside TPM vendor. However, this revenue would only be accessible if contracts were negotiated with the principal suppliers of equipment to each market sector. In the case of word processors, for example, it depends on agreements with companies such as NBI and CPT. Excluded from the available word processor service revenues are other major vendor products such as IBM's.

EXHIBIT II-2

U.S. 1982 SUPPORT SERVICES REVENUE
(\$ million)

Number	EQUIPMENT CATEGORY	HARDWARE				SOFTWARE		
		Maintenance	Education	Over The Counter Parts	Maintenance	Education	Installation	TOTAL
1	Personal Computers (home)	10	5	45	*	*	*	60
2	Personal Computers (business)	100	5	260	*	10	*	375
3	Workstations	135	*	40	10	*	*	185
4	Systems ≤ \$25K	1220	25	230	215	*	15	1705
5	Systems > \$25K ≤ \$350K	480	15	46	90	15	4	650
6	Systems > \$350K	1839	54	58	281	47	17	2296
7	Displays	555	*	180	*	*	*	735
8	Printers/Copiers/Plotters	680	*	170	*	*	*	850
9	Point of Sale Devices	45	1	9	10	*	*	65
10	Other Peripherals	1090	*	200	*	*	*	1290
11	Telecom Equipment	360	*	40	*	*	*	400
12	Typewriters/Word Processors	1440	10	120	10	*	*	1580
13	Banking Equipment	23	*	3	*	*	*	26
TOTALS		7977	115	1401	616	72	36	10217

* negligible

EXHIBIT II-3

U.S. 1987 SUPPORT SERVICES REVENUE

(\$ million)

Number	EQUIPMENT CATEGORY	HARDWARE				SOFTWARE		TOTAL
		Maintenance	Education	Over The Counter Parts	Maintenance	Education	Installation	
1	Personal Computers (home)	100	15	50	5	10	*	180
2	Personal Computers (business)	400	30	750	20	50	*	1250
3	Workstations	500	*	170	20	5	*	695
4	Systems ≤ \$25K	3400	75	700	740	*	55	4970
5	Systems > \$25K ≤ \$350K	965	34	86	310	45	15	1455
6	Systems > \$350K	4090	125	105	735	143	52	5250
7	Displays	1574	*	582	*	*	*	2156
8	Printers/Copiers/Plotters	2140	*	560	*	*	*	2700
9	Point of Sale Devices	103	3	24	28	*	2	160
10	Other Peripherals	2400	*	550	*	*	*	2950
11	Telecom Equipment	725	*	70	*	*	*	795
12	Typewriters/Word Processors	3583	27	270	45	*	5	3930
13	Banking Equipment	80	*	10	2	*	*	92
TOTALS		20060	309	3927	1905	253	129	26583

* negligible

EXHIBIT II-4

OFFICE AUTOMATION EQUIPMENT SERVICE
AVAILABLE REVENUES BY MARKET SECTOR

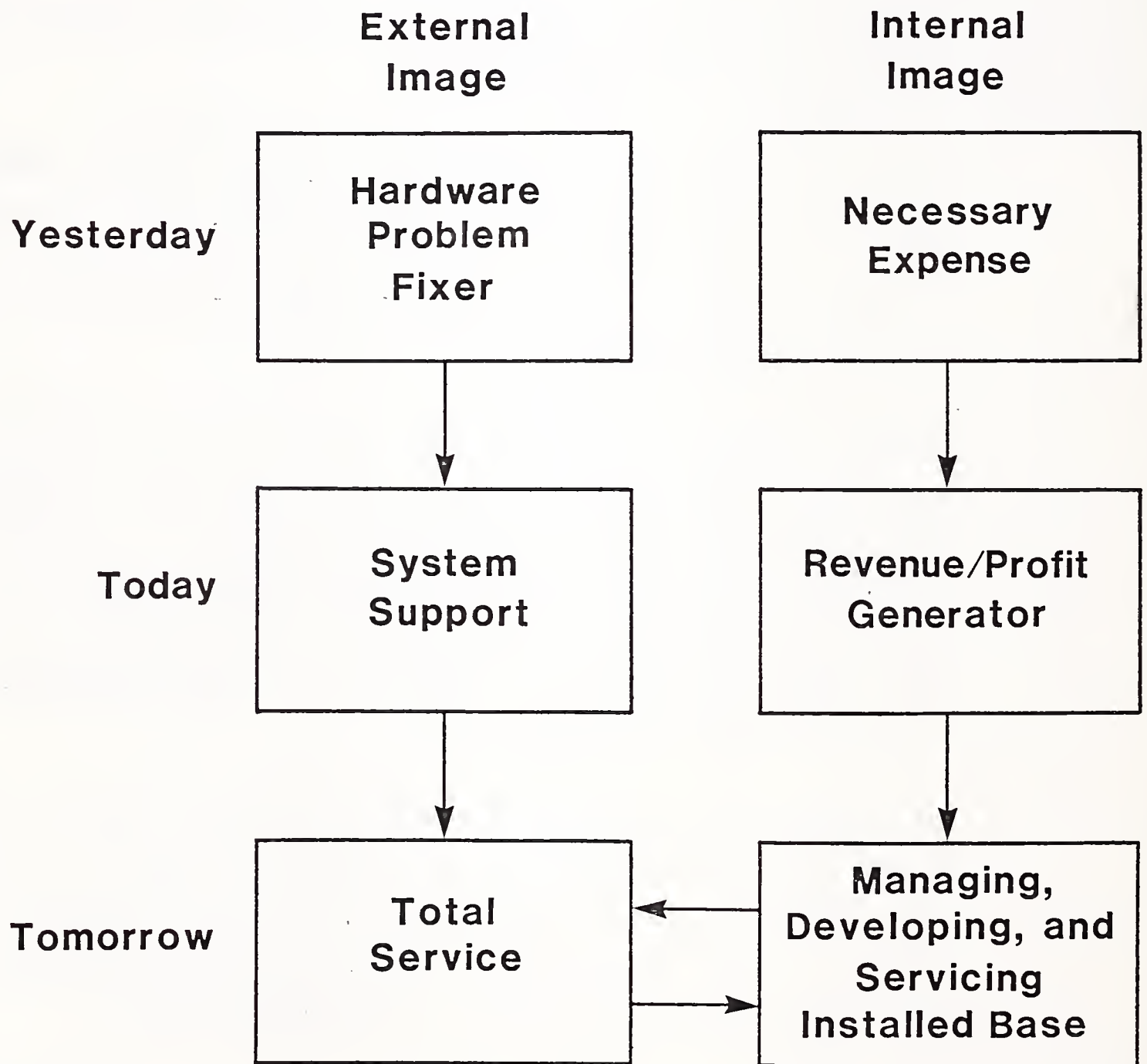
SECTOR	1982		1987
	TOTAL SERVICE REVENUE (\$ millions)	AVAILABLE REVENUE (\$ millions)	AVAILABLE REVENUE (\$ millions)
Personal Computers (Home)	\$60	\$15*	\$45
Personal Computers (Business)	375	110*	350
Workstations	150	50	180
Displays	140	20	60
Printers/Copiers/Plotters	170	50	160
Other Peripherals	250	25	60
Telecommunications Equipment	200	40	80
Typewriters/Word Processors	1,580	150	370
Office-related Minicomputers	200	30	100
Totals	\$3,125	\$490	\$1,405

*Undeveloped market not properly serviced by anyone to date.

D. CHANGING ROLE OF FIELD SERVICE

- It is important for AT&T to recognize the environment into which they would be entering and how it has changed in the last five years.
- In the past the internal (company) view of the field service role has always been at odds with the external (user) view:
 - In the past many vendors viewed field service as a necessary expense: in order to sell products a vendor was expected to service them when they failed as well as install, upgrade, and deinstall. Meanwhile, users viewed the field service engineer as a hardware problem fixer: engineering in a literal sense.
 - Today, both the external and internal views of field service have changed: internally, field service is viewed as a source of revenue growth and profit (90% of all vendors' field service organizations operate as profit centers now), while externally the user looks to field service to provide systems support, which includes (depending on the user base) system software and application software maintenance as well as hardware maintenance.
 - In the near future the views of both users and company will sometimes coincide as users expand the list of services they expect to receive from the field service organization, and the company simultaneously expands its expectations of the service group to include managing and developing the account base in addition to system support.
- A graphic summary of that development is shown in Exhibit II-5.

CHANGING ROLE OF FIELD SERVICE



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E. CHANGING ROLE OF SUPPORT STAFF

- The roles of both hardware and software engineers are also changing, from the standpoint of job content, type of intervention accomplished in the field, and degree of specialized knowledge needed to accomplish the function (skill mix).
- In the past an engineer was dispatched to a problem site without knowing what type of failure to expect. The diagnosis was made, with available means, at the systems level. Currently, thanks to a broader and broader application of remote diagnostics, the failure can be isolated down to the subsystem before the field engineer arrives. In the future many systems will be self-diagnosing down to the component level.
- Little or no repair is attempted on site at present (in contrast to yesterday's engineer). Instead a failed board is swapped and repaired off-site (at a repair center). In the near future redundant circuitry and components will be more widely used so that the failed system may continue to function.
- A similar picture emerges for the software engineer who will be able, in the future, to remotely access failed software systems for both diagnostic and down-line loading of patched or revised code to the library version of the failed program. This will then be booted for use by the system. Although this patching will not often be the definitive revision of the failed system, it will nevertheless allow the user to operate in a degraded mode. Exhibits II-6 and II-7 summarize the trends.

F. CONVERSION OF FIELD SERVICE

- Field service has seen many dramatic changes over the last five years, and an even more dramatic shift is under way for the next five-year period.

CHANGING ROLE OF HARDWARE ENGINEER

	Past	Present	Future
Diagnostic	<ul style="list-style-type: none"> • On Arrival with Available Means • At System Level 	<ul style="list-style-type: none"> • Prior to Arrival • At Sub-system Level 	<ul style="list-style-type: none"> • Self Diagnosing • At Component Level
Repair	<ul style="list-style-type: none"> • On-site Repair of Failed Component 	<ul style="list-style-type: none"> • Swap Failed Board, No Repair 	<ul style="list-style-type: none"> • Redundant or Fail-soft Hardware • Swap Failed Subsystem
System Status	<ul style="list-style-type: none"> • Down 	<ul style="list-style-type: none"> • Down 	<ul style="list-style-type: none"> • Up

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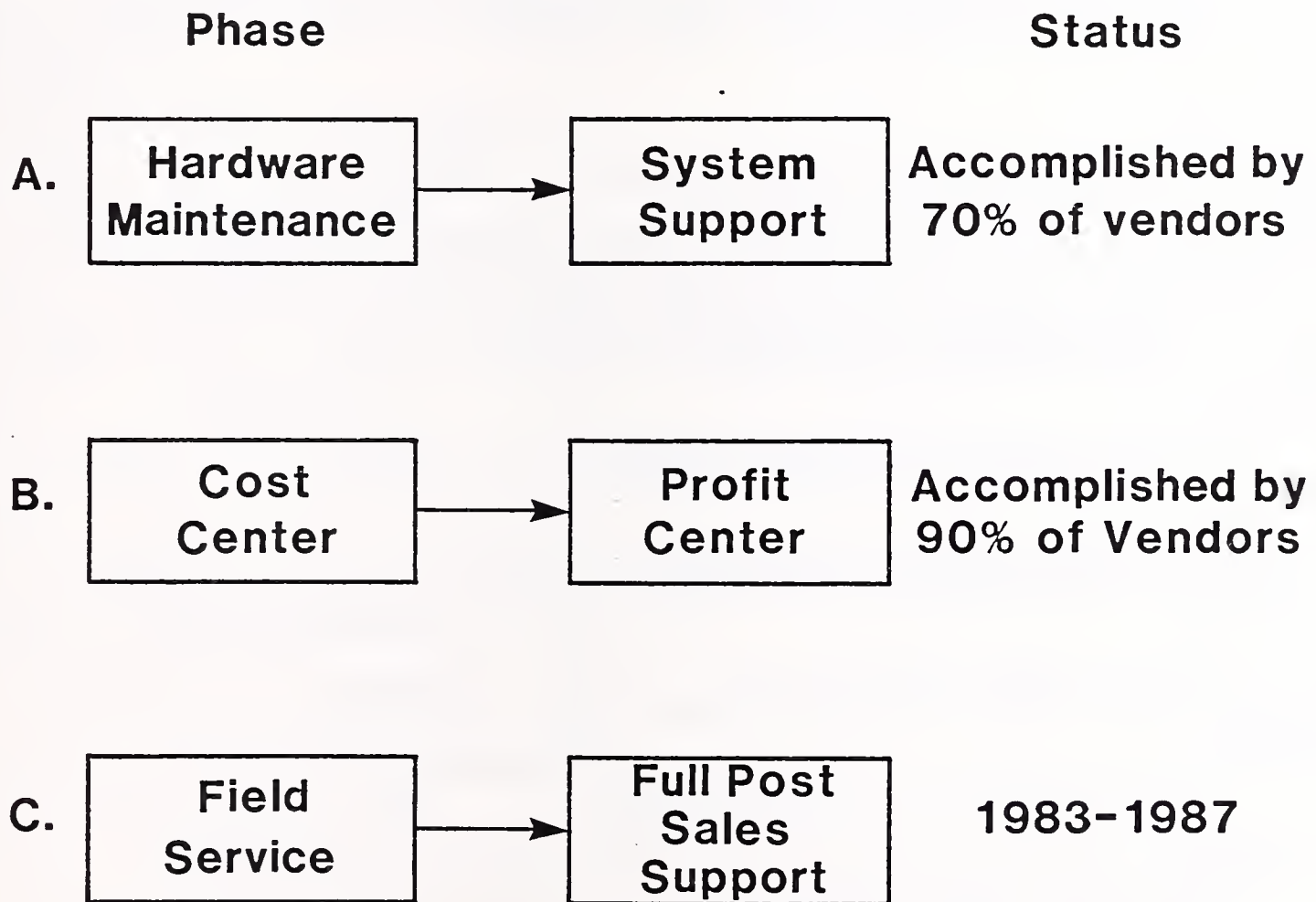
CHANGING ROLE OF SOFTWARE ENGINEER

	Past	Present	Future
Diagnostic	• On-site	• Support Center Assistance	• Remote Tie In
Repair	• On-site	• Revised Version Shipped	• Down-line Loading of Patched or Revised Code
System Status	• Down	• Down	• Degraded But Still Operable

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- The shift to systems support was made by 70% of all U.S. manufacturers by the end of 1982, as shown in Exhibit II-8. The degree of integration is variable, according to the market that is supported. Some inroads on application support have been made (i.e., application products provided by the systems vendor), but little headway has been made on servicing third-party software products, as shown in Exhibit II-9.
- An equally important shift has been made from cost center control to profit center (although the precise definition of this varies from vendor to vendor). At year-end 1982, 90% of all major U.S. computer vendors had accomplished that shift. The next major shift concerns a move from the concept of field service to that of full post-sales support or the total service concept.
- The main component of this shift, as shown in Exhibit II-10, is the polarization of all support activities under two lines of responsibilities:
 - Presale support (responsibility of marketing with service manpower subcontracted as needed).
 - Postsale support (responsibility of field services with sales manpower involved as needed).
- The principal goal of postsale support is to manage, develop, and monitor (through ongoing user requirements analysis) the progression of the installed base, site by site.

CONVERSION OF FIELD SERVICE TO TOTAL SERVICE CONCEPT



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LARGE SYSTEM INTEGRATION OF S/W SUPPORT INTO H/W SUPPORT FUNCTION

MARKET	SOFTWARE SUPPORT PROVIDED	PERCENT OF VENDORS IMPLEMENTING	DEGREE OF INTEGRATION (percent)	
			1983	1985
Large Systems	Systems Software	71%	76%	88%
	Applications Software	43	100	100
	Third Party Software	14	100	100
Small Systems	Systems Software	60%	46%	68%
	Applications Software	53	27	47
	Third Party Software	0	0	0
Office Products	Systems Software	83%	16%	40%
	Applications Software	50	12	22
	Third-party Software	33	2	10

CONSOLIDATE ALL CLIENT SUPPORT INTO TWO AREAS OF RESPONSIBILITY

- **Prospect Needs Evaluation/Presale Support**
 - Responsibility of Marketing and Sales with Service Manpower Subcontracted as Needed (e.g., Environmental Planning, Installation Planning)
 - Subcontracting Entails Intercompany Billing
- **Postsale Support/Customer Management and Development**
 - Responsibility of Field Services with Ongoing User Requirements Analysis
 - Sales Involved as Needed (e.g., Add-on Sales, Upgrades, Software, and New Model Sales)
 - User Requirements Analysis Is Site by Site, Summarized Model by Model

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III THE STRATEGIC LINK

III THE STRATEGIC LINK

A. INTRODUCTION

- In order to have any hope of success in the office automation service marketplace, AT&T needs to have a clearly defined strategy. This strategy must have a strong and clearly identifiable public image that enables the marketplace to answer the question "What role does AT&T play in office automation?"
- INPUT believes that there are two possible strategies that can be pursued:
 - Office automation solutions: where AT&T undertakes the role of total solution supplier, providing system design, equipment and software selection, software and procedure writing where necessary, installation planning, OEM purchasing, installation, training, and documentation.
 - Network specialist: where AT&T concentrates on providing the network design, interface design consulting (and programming where appropriate) to link the various office automation equipment elements together for a corporation and, as a by-product of the solution provided, will service the final system from a hardware and a software standpoint.
- Both options have advantages and drawbacks. The advantage in offering office automation solutions lies in the control of a larger per-site budget, the

participation in professional service activities (such as system design and programming) and the service revenue, as well as the margins produced by OEMing the equipment and software.

- There are several drawbacks:
 - AT&T has no office automation image in the marketplace, leading potential users to ask, "What does AT&T know about office automation that we don't?" (or that other vendors such as Wang, IBM, Datapoint, etc., do).
 - An exhaustively detailed blueprint for office automation has to be available, showing how each component of hardware and software can be integrated, how the implementation of full office automation can be phased, how a company can enter the various levels, how a company can identify which stage of automation it has already reached, and how it can move from one level to the next, etc.
 - Specific services (with appropriate pricing) that package such an approach need to be thought out; the drawback with professional services in the classical sense is that its total costs cannot be clearly identified. Fixed-price contracts are far easier to come by than are open-ended T&M contracts.
- The network specialist option has an obvious advantage: it makes the most of AT&T's market image. No user will ask, "What does AT&T know about networks that I don't?" The disadvantage in the approach lies in the difficulty of packaging the service to the marketplace:
 - A fixed-price network consulting contract approach could easily lose money; a T&M contract might be hard to sell.

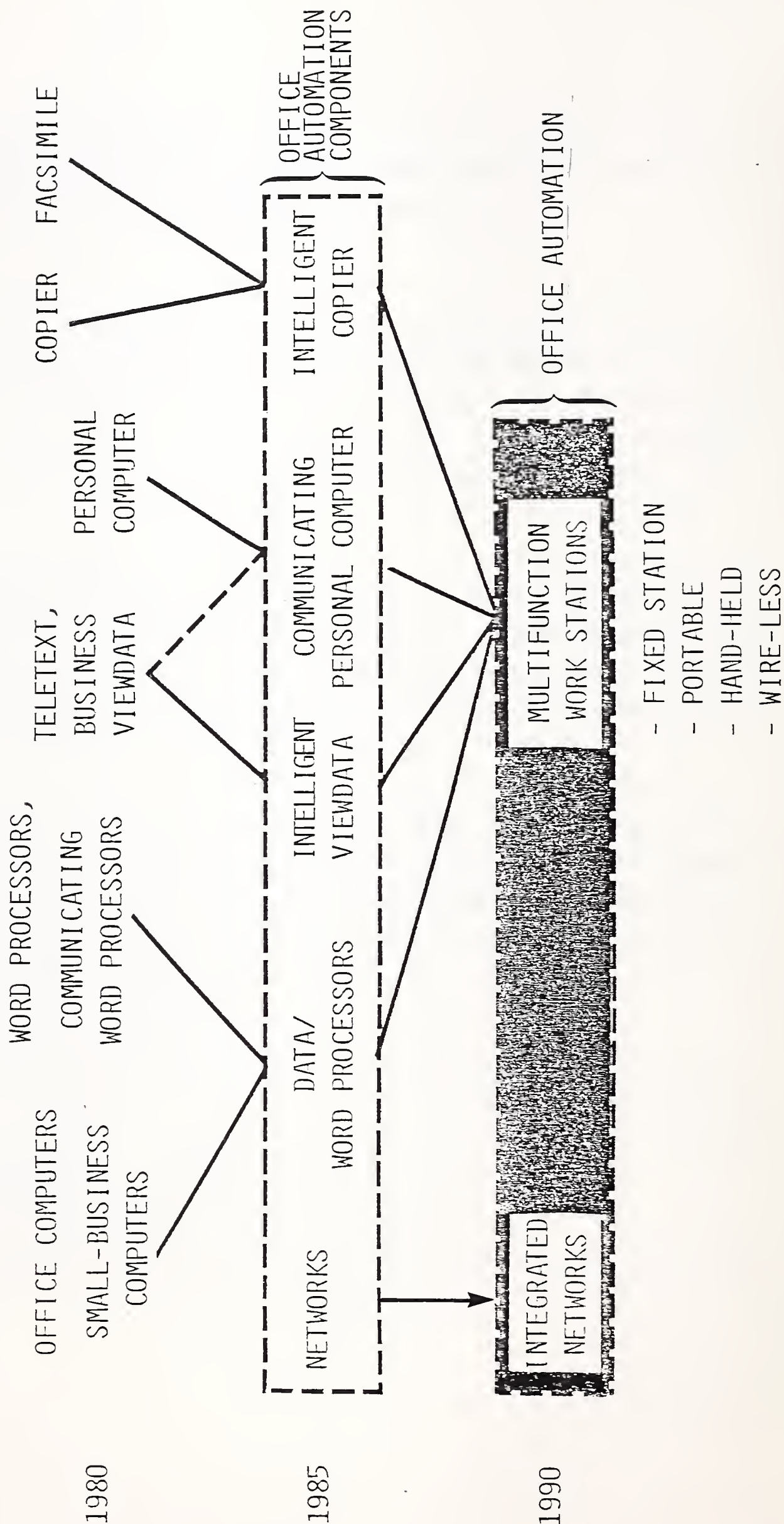
- Programming services to provide implementation support for linking different vendor equipment into a unified automation system would require a broad array of programmer/analyst skills covering hundreds of products.
- Consulting, at the front end of implementation, is difficult to tie to TPM service at the back end of implementation.

B. INTEGRATION - KEY TO OFFICE AUTOMATION

- At the present time, office automation is an ill-defined scheme for integrating the work functions of separate individuals in a way that facilitates communications, exchange of data, processing, and distribution of the results. There are almost as many definitions of office automation as there are vendors.
- The essential component - integration - has an informational and functional content that will accelerate and motivate the fusing of separate markets and products in the manner indicated in Exhibit III-1. The new markets targeted by the new multifunctional products (e.g., data/word processors) need a catalyst to make them viable. In other words, without some driving force or market leader, these markets may develop at a far slower pace than is otherwise possible. AT&T can fill such a void with either of the strategic options discussed earlier. .
- INPUT believes that today's market is for office equipment, not office automation, that the essential players (from a hardware vendor standpoint) are almost in place, and that true office automation is unlikely to be a reality for most corporations before 1990.

EXHIBIT III-1

WORKSTATION INTEGRATION: INFORMATION INTEGRATION, FUNCTIONAL INTEGRATION



- An overview of the proliferation of vendors and vendor products is shown in Exhibit III-2. The units installed as of 1982, and the expected growth of that base, show an almost three-fold expansion of the units by 1986. This is formidable growth of the component parts needed to make up a meaningful office automation market, but it does not indicate the degree of integration accomplished between the components without which office automation does not exist. The dollar value of shipments for major office products sales is provided in Exhibit III-3.

C. USER ATTITUDES TOWARD ALTERNATIVE SERVICE DELIVERY MODES

- When targeting the office automation market service opportunities, one key question is what kind of services users believe they require. INPUT's user research provides an immediate answer.
- Exhibit III-4 details user preferences for hardware and software maintenance among the principal maintenance options that are open to them:
 - Traditional on-site service, i.e., a visit by a qualified technician to resolve the failure (this does not necessarily mean repair).
 - User involvement in diagnosis of failed systems, working with a support center (usually by telephone contact and manipulation of the failed system through a keyboard).
 - User replacement of circuit boards and/or patching software.
 - User delivering failed modules to a repair center (carry in).
 - On-site standby of service personnel during critical periods.

EXHIBIT III-2
OFFICE AUTOMATION AND INTERCONNECT EQUIPMENT

TYPE OF EQUIPMENT	NUMBER OF VENDORS	NUMBER OF MODELS	INSTALLED BASE	
			1982	1986 (FORECAST)
WORD PROCESSORS	45	175	1,000,000	2,600,000
ELECTRONIC TYPEWRITERS	20	70	550,000	2,700,000
DESK TOP AND PERSONAL COMPUTERS (FOR OFFICE USE)	165	285	1,900,000	14,100,000
COPYING EQUIPMENT	34	180	2,100,000	4,800,000
COMPUTER TERMINALS	110	635	9,400,000	20,100,000
OTHER OFFICE AUTOMATION EQUIPMENT (FACSIMILE, ETC.)	70	370	3,250,000	8,400,000
T O T A L S	440	1,715	18,200,000	52,700,000

ESTIMATED U.S. SALES OF OFFICE PRODUCTS

(\$ MILLIONS)

P R O D U C T	Y E A R				
	1981	1982	1983	1984	1985
PBX/PABX	\$2,600	\$3,000	\$3,300	\$3,700	\$4,100
COPIERS	3,400	4,000	4,500	5,000	5,940
WORD PROCESSING SYSTEMS/WORK STATIONS	1,700	2,000	2,600	3,100	3,800
FACSIMILE	100	300	500	800	1,000
PERSONAL COMPUTERS (BUSINESS USE)	1,200	1,800	2,900	3,800	5,600
T O T A L	\$9,000	\$11,100	\$13,800	\$16,400	\$20,440

EXHIBIT III-4

USER ATTITUDES TOWARDS ALTERNATIVE DELIVERY MECHANISMS

(RATING SCALE OF 1-10, 10 BEST)

DELIVERY MECHANISMS	OVERALL		COPIERS		FACSIMILE		PBX/PABX		PERSONAL COMPUTER		WORD PROCESSOR		WORK STATIONS	
	HARDWARE	SOFTWARE	HARDWARE	SOFTWARE	HARDWARE	SOFTWARE	HARDWARE	SOFTWARE	HARDWARE	SOFTWARE	HARDWARE	SOFTWARE	HARDWARE	SOFTWARE
TRADITIONAL ON-SITE SERVICE	8.32	8.24	8.92	N/A	8.69	N/A	8.28	7.28	6.95	6.67	8.83	8.75	8.42	8.42
USER INVOLVEMENT IN DIAGNOSIS, WORKING WITH SUPPORT CENTER	6.42	6.43	6.11	N/A	5.69	N/A	6.21	5.34	6.57	6.39	6.99	6.91	6.35	6.35
USER REPLACEMENT OF CIRCUIT BOARDS, COMPONENT AND SOFTWARE PATCHING	4.73	4.91	3.90	N/A	2.97	N/A	5.10	4.37	5.21	5.25	5.29	5.28	4.97	4.97
USER DELIVERING MODULES TO REPAIR CENTER	3.98	4.20	2.43	N/A	3.06	N/A	3.10	3.27	5.36	5.26	4.09	4.11	4.23	4.23
ON-SITE STANDBY OF SERVICE PERSONNEL DURING CRITICAL PERIODS	4.02	4.26	3.20	N/A	3.00	N/A	6.76	5.82	2.98	2.95	4.41	4.13	4.55	4.55

- The message is clear: despite vendor preference to involve users in the diagnostic and repair functions, users prefer the vendor to handle the entire service function unaided. This is sometimes mitigated by the various service discounts that vendors have been willing to offer, but good quality, prompt, on-site service is essentially what users are willing to pay for.

D. ENTRY STRATEGY

- Given that neither of the two strategic options discussed in IIIA is entirely satisfactory per se, it becomes necessary to seek an entry strategy that optimizes AT&T's obvious assets (in terms of current activities and image) and that minimizes the market resistance and competitive resistance that the entry strategy would encounter.
- AT&T's assets, as related to office automation service opportunities, are:
 - Ownership of telephone handsets and established position in customer premise equipment service.
 - Customer network planning and engineering personnel, including the planned Residence Service Centers, which could easily handle corporate network services, planning, and engineering.
 - Enormously strong communications image in the U.S. and abroad.
- One feasible approach might therefore be to enter the office automation marketplace as a network consultancy that would provide the services necessary to convert the installed office equipment at a given corporation into an integrated office automation system. Then, having ridden the communications image to establish a foothold in Phase I office automation corporate planning, leverage this position into assisting in the implementation of succes-

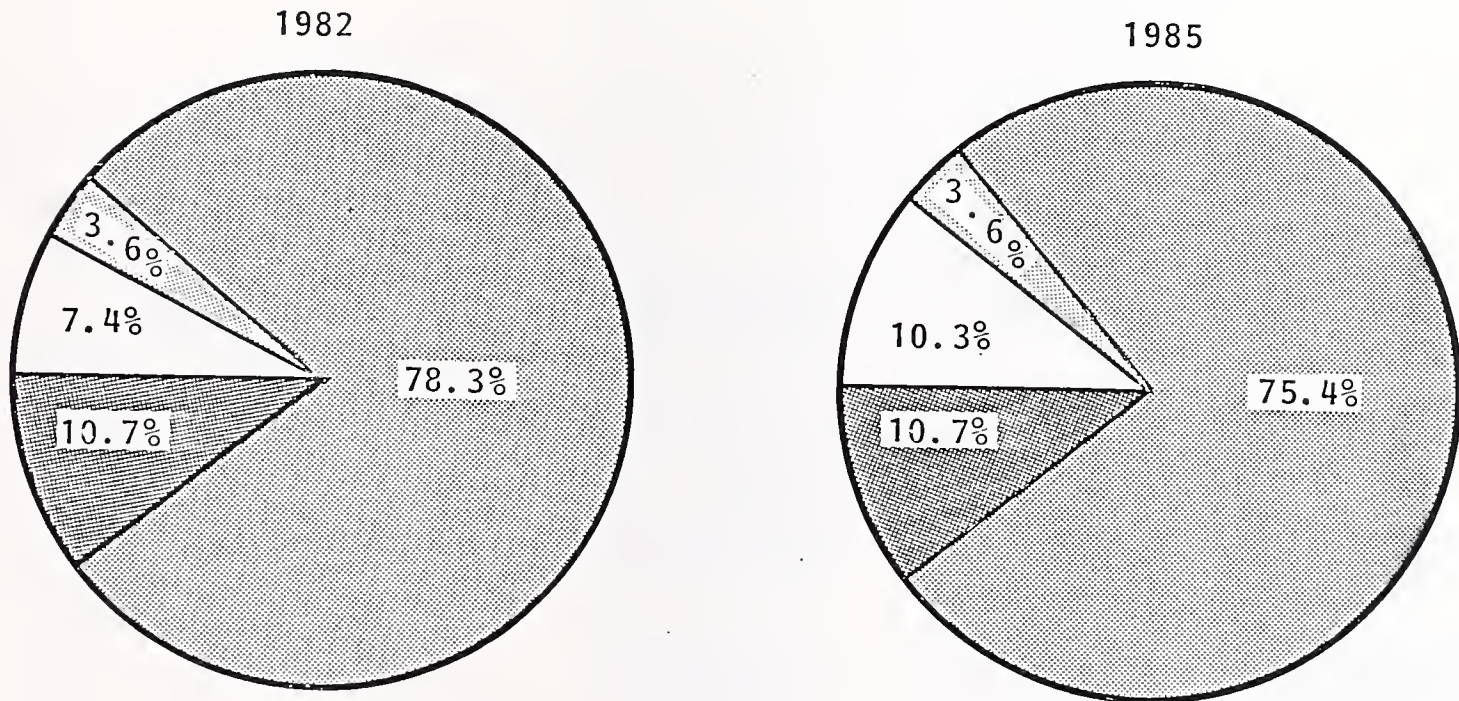
sive phases, adding programming, system selection, and procurement and equipment maintenance services support.

- The following services could be offered in Phase I:
 - Management consulting on need for office automation and strategic options open to corporations (a McKinsey-type service, but one that McKinsey is not qualified to offer).
 - Network consulting, including network design, modeling, load simulation, interface definition, etc.; there are very few companies of any size offering these capabilities in the U.S.
 - Office automation equipment selection and software programming (essentially turnkey solutions).
 - Office equipment integration (based on the existing installed products, adding system design, interfacing, and file matching).
- Nearly all of the above services are best offered on an unbundled (T&M) basis (i.e., quoted for on a time-and-materials basis, with phases for implementation and options to cover the various levels of effort the customer may wish to commit to). The professional service (consulting, modeling, design, and programming) and turnkey system (systems design, hardware, software, programming) approaches will find a ready market; it is unlikely that clients would accept an FM approach unless it concerned a large, multifaceted private corporate network that ties multiple geographical locations together.
- The pricing techniques, hourly rates, and important factors (as viewed by users when selecting a professional services vendor) are summarized in Exhibits III-5, III-6, and III-7.

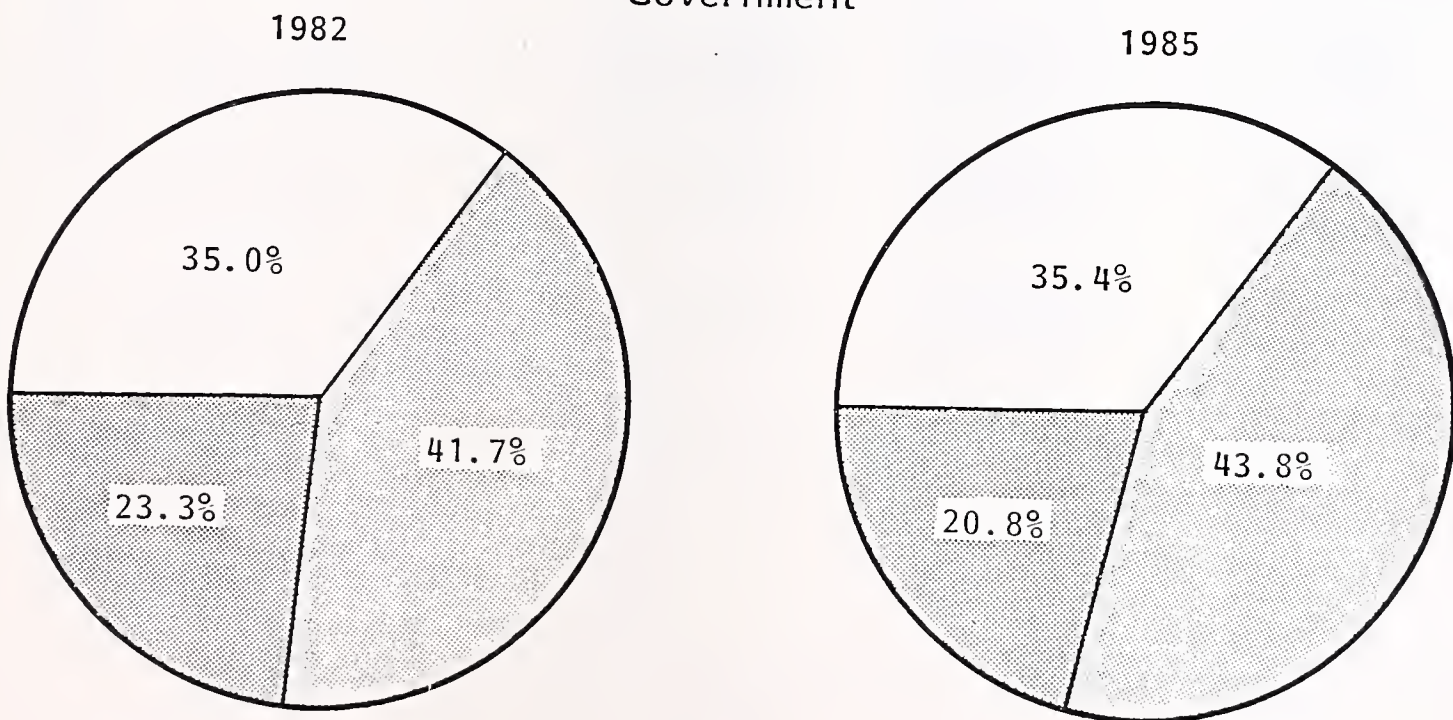
EXHIBIT III-5

PRICING TECHNIQUES OF PROFESSIONAL SERVICES VENDORS

Commercial



Government



Fixed Price

Cost Plus

Time and Materials

Other

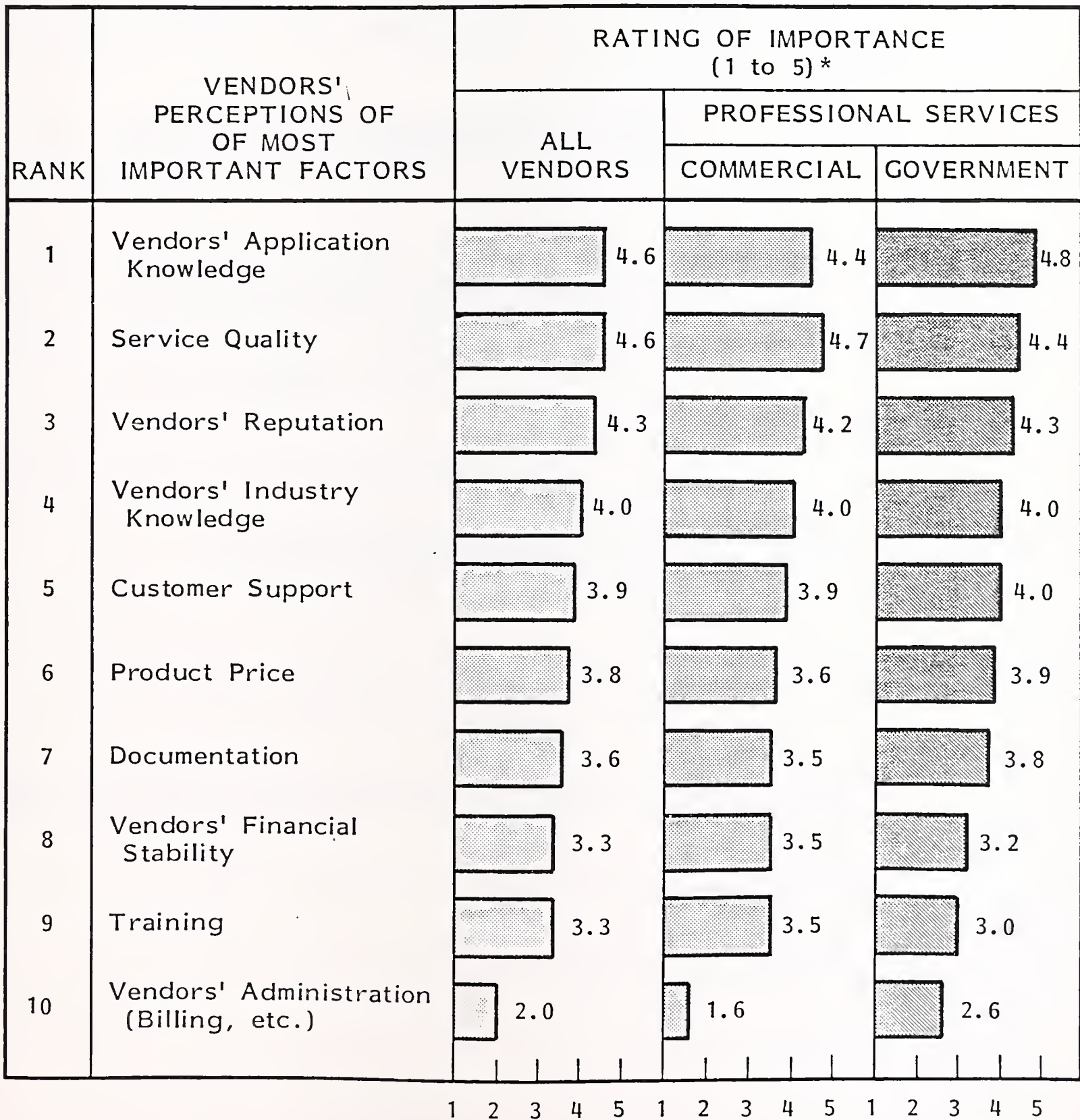
EXHIBIT III-6

PROFESSIONAL SERVICES VENDORS' PUBLISHED
HOURLY RATES FOR ANALYSTS AND PROGRAMMERS

TYPE OF RATE	HOURLY RATES				
	GOVERNMENT		COMMERCIAL		TOTAL AVERAGE
	RANGE	AVERAGE	RANGE	AVERAGE	
Analyst					
Minimum	\$20.00 - 62.50	\$54.00	\$30.00 - 55.00	\$41.07	\$45.77
Maximum	50.00 - 100.00	83.75	30.00 - 90.00	67.14	\$73.18
Programmer					
Minimum	20.00 - 20.00	46.25	25.00 - 100.00	54.00	\$51.18
Maximum	36.00 - 125.00	67.75	50.00 - 125.00	84.29	\$78.27
Total	\$20.00 - 125.00	\$62.94	\$30.00 - 125.00	\$61.63	\$62.10

EXHIBIT III-7

RESPONDENT VENDORS' RATINGS OF THE MOST IMPORTANT FACTORS
CONSIDERED BY CUSTOMERS IN SELECTING PROFESSIONAL SERVICES



* Rating: 1 = Low, 5 = High

E. COMPETITION

- Very few vendors offer software to assist consultants or users to model networks. Network Analysis Corporation (Great Neck, Long Island) is one of the few vendors that offers such software. Other vendors that offer some network simulation (but only in the context of their own networks) include GEISCO, Tymshare, and CDC.
- Similarly, there are few companies offering network consulting. The list known to INPUT contains mostly small companies.
 - Network Communications International (Washington).
 - Telecommunications Systems Group (New Jersey).
 - DMW (Oregon).
 - Network Znalysis Corporation (acquired by CONTEL).
 - Deal & Associates.
 - Network Strategies.
- Companies that are or will become competition for such an approach include:
 - GEISCO.
 - IBM/IN.
 - National CSS.
 - Tymshare.

- A profile of each of these is included in Appendix B.
- The salary structures of field service operations across the U.S. are included in Appendix C. This was provided by AFSM (Association of Field Service Managers).

F. TACTICAL AND STRATEGIC CONCLUSIONS

- Seen from the tactical and strategic standpoints, the office automation service opportunities must take into account the trends and issues that are prevalent in the marketplace, as well as the issues that this section has already discussed.
- The main tactical issues are:
 - The phenomenal proliferation of personal computers for which no vendor has provided adequate service.
 - The "full service need" that will emerge as a result of the gradual integration of office products.
 - The increasing complexity of equipment (and software).
 - The deregulation of the telecommunication environment.
 - The growing user demand for shorter response and repair times.
 - The growing range of user choices in respect to products available.
 - The need to contain service costs.
 - The gradual growth of local area networks.

- These issues, the challenges they offer and the recommended short-term action plans are summarized in Exhibit III-5.
- Similarly, from a strategic standpoint the main trends, the challenges they pose to field service management, the opportunities available and the recommendations INPUT has for long-term action plans are given in Exhibit III-6.

EXHIBIT III-8

TACTICAL ISSUES AND CONCLUSIONS

KEY TRENDS AND FACTORS	IMMEDIATE CHALLENGES TO FIELD SERVICE ORGANIZATIONS	SHORT TERM ACTION PLANS 1984-1985
RAPIDLY GROWING USE OF PERSONAL COMPUTERS IN BUSINESS AND INDUSTRY	PROVIDE INTEGRATED RESPON- SIVE NATIONWIDE ON-SITE SERVICE FOR PC'S ON A COST- EFFECTIVE BASIS	1. EXPAND SERVICE CAPABILITY TO INVOLVE PC'S 2. INTRODUCE FULL SERVICE PORTFOLIO FOR PC END USERS WILLING TO PAY
GROWING INTEGRATION OF OFFICE AUTOMATION PRODUCTS	SERVICE FULL PRODUCT ARRAY WITHOUT FINGER POINTING	1. ESTABLISH SERVICE MANAGEMENT CAPABILITY AND FUNCTION 2. EXPAND TECHNICAL SKILLS AND PARTS AVAILABILITY AT FIELD LEVEL
INCREASING COMPLEXITY AND SOPHISTICATION OF EQUIPMENT	IMPROVE ABILITY TO IDENTIFY PROBLEMS AND PROVIDE RAPID RESPONSE	1. IMPLEMENT REMOTE DIAGNOSTICS/ TECHNICAL ASSISTANCE CENTER HOT LINE
DEREGULATION OF TELCOM- MUNICATIONS (PBX/PABX) EQUIPMENT AND BLURRING OF FUNCTIONS BETWEEN DP, OFFICE AUTOMATION, AND TELECOMMUNICATIONS	PROVIDE COST-EFFECTIVE SERVICE IN DIRECT COMPETITION WITH NEW TELECOMMUNICATIONS VENDORS (ATTIS, RBOC'S, ETC.)	1. RECOGNIZE IMPACT OF DEREGULATION; GAIN UNDERSTANDING OF TELECOM- MUNICATIONS SERVICE AND SUPPORT PRACTICES 2. EXPAND CAPABILITY TO SERVICE TELECOMMUNICATIONS PRODUCTS
INCREASINGLY TIGHTER RESPONSE AND REPAIR TIME REQUIREMENTS DUE TO GROWING DEPENDENCE ON EQUIPMENT BY USER	MANAGE AND CONTROL SERVICE RESPONSE AND REPAIR BY TARGETS IN ACCORDANCE WITH CONTRACTUAL GUARANTEES AND AGREEMENTS. AVOID "OVER" OR "UNDER" SERVICING	1. IMPLEMENT COMPUTERIZED SYSTEMS TO MANAGE AND CONTROL: * CALL HANDLING AND DISPATCH AND * LOGISTICS/SUPPLY BASED ON MANAGEMENT SET TARGETS AND OBJECTIVES
WIDE RANGE OF CHOICES DUE TO INCREASING NUMBER OF VENDOR AND PRODUCTS	PROVIDE CONSULTING AND TECHNICAL ASSISTANCE AS PART OF INITIAL SALES/ SERVICE DECISION -- PLACE INCREASING EMPHASIS ON SERVICE QUALITY AND RESPONSIVENESS	1. ESTABLISH TECHNICAL CONSULTING ASSISTANCE AND INSTALLATION SUPPORT PLANNING SERVICES 2. PROVIDE SERVICE ON A FORMAL BASIS FOR A PRICE
INCREASING CONCERN OVER SERVICE COST CONTAINMENT	DEVELOP INNOVATIVE PRICING FOR PRODUCT PORTFOLIO - TARGETED BY MARKET SEGMENT	1. ESTABLISH FULL PRODUCT/PRICE PORTFOLIO 2. EVALUATE CURRENT SERVICE PRICES
INCREASING USE OF LOCAL AREA NETWORKS (LAN) TO INTEGRATE INDIVIDUAL OFFICE AUTOMATION PRODUCTS	PROVIDE ABILITY TO SERVICE AND SUPPORT LAN TECHNOLOGY AS PART OF PRODUCT SERVICES	1. EXPAND TECHNICAL CAPABILITIES TO SUPPORT LAN TECHNOLOGY 2. OFFER LAN SERVICE AND SUPPORT
INCREASING DISSATISFACTION WITH SERVICES OFFERED BY BOTH OEM VENDORS AND RETAIL DISTRIBUTION CHANNELS	EXPAND NATIONAL SERVICE, AND BACK UP RETAIL/MASS MERCHANDISE CHANNELS TO PROVIDE INTEGRATED SERVICE SUPPORT WHEN REQUIRED	1. OFFER NATIONAL CALL HANDLING AND TECHNICAL ASSISTANCE SUPPORT TO BACK UP LOCAL RETAILERS 2. PROVIDE FULL SERVICE AT A PRICE FOR THOSE SEGMENTS REQUIRING SERVICE ON-SITE

EXHIBIT III-9

STRATEGIC ISSUES AND CONCLUSIONS

MAJOR TRENDS AND FACTORS	LONG RANGE CHALLENGES TO FIELD SERVICE MANAGEMENT	STRATEGIC OPPORTUNITIES	RECOMMENDATIONS FOR LONG-TERM ACTION PROGRAM; 1985-1988
INTEGRATED OFFICE SYSTEMS COMBINING DATA PROCESSING, WORD PROCESSING AND TELE-COMMUNICATIONS FUNCTIONS	<ul style="list-style-type: none"> ESTABLISH SERVICE AS A SEPARATE LINE OF BUSINESS IN SUPPORT OF THE GENERAL OFFICE AUTOMATION TECHNOLOGY DEVELOP A FULL SERVICE ORGANIZATION TO PRODUCE A FULL ARRAY OF "PRODUCTS" FOR THE OFFICE ENVIRONMENT INCLUDING: <ul style="list-style-type: none"> - INSTALLATION & SITE PLANNING - INSTALLATION - HARDWARE MAINTENANCE - SOFTWARE MAINTENANCE - MOVES AND CHANGES - UPGRADES/CONFIGURATION CHANGE - DOCUMENTATION - TRAINING - PARTS/SUPPLIES - CONSULTING - OTHER SUPPORT SERVICE 	<ul style="list-style-type: none"> SERVICE AS A SEPARATE REVENUE AND PROFIT GENERATING LINE OF BUSINESS SERVICE MANAGEMENT AS A FRAMEWORK/CONCEPT FOR MANAGING AND DELIVERING SUPPORT 	<ul style="list-style-type: none"> ESTABLISH FULL PROFIT CENTER SERVICE OPERATION WITH SUPPORTING MARKETING, PRODUCT AND BUSINESS PLANNING AND FINANCIAL/ACCOUNTING FUNCTIONS DEFINE FULL SERVICE PRODUCT PORTFOLIO EXPAND INTO THIRD PARTY MAINTENANCE FOR THOSE PRODUCTS UNDER THE SERVICE MANAGEMENT UMBRELLA
GROWING IMPORTANCE OF SERVICE IN PURCHASE DECISION AS PRODUCTS BECOME INCREASINGLY COMMODITY-LIKE AND LIFE CYCLES SHORTENED			
NEED FOR INTEGRATED SINGLE-SOURCE OF SERVICE; ESPECIALLY IN CONNECTION WITH FULLY INTEGRATED NETWORK BASED OFFICE AUTOMATION SYSTEMS	<ul style="list-style-type: none"> IMPLEMENT A COMPREHENSIVE SYSTEM TO MANAGE AND CONTROL SERVICE AS A BUSINESS INCLUDING: <ul style="list-style-type: none"> - INSTALLATION-PLANNING AND SCHEDULING - CALL HANDLING AND DISPATCH - PREVENTIVE MAINTENANCE SCHEDULING - TECHNICAL ASSISTANCE/REMOTE DIAGNOSTICS - ORDER PROCESSING AND INVENTORY CONTROL - DATA BASE MANAGEMENT - REPORTING - INVOICING & COST ACCOUNTING PROVIDE SERVICE PORTFOLIO CUSTOMIZED TO MEET NEEDS OF INDIVIDUAL MARKET SEGMENTS AND NICHEs BASE PRICING ON EVALUATED COMBINATION OF COST, COMPETITION, AND VALUE-IN-USE 	<ul style="list-style-type: none"> MANAGEMENT AND CONTROL OF SERVICE DELIVERY, RESPONSIVENESS, AND QUALITY TO MEET CUSTOMER NEEDS AT A PROFIT INCREASE PROFIT MARGINS AND RETURN ON INVESTMENT FROM SERVICE BASED ACTIVITIES 	<ul style="list-style-type: none"> COLLECT AND ALLOCATE DATA ON COSTS AND REVENUES FROM INDIVIDUAL PRODUCTS AS A BASIS FOR SERVICE PRICING IMPLEMENT REMOTE DIAGNOSTICS AND TECHNICAL ASSISTANCE CENTERS ACCESSIBLE VIA A NATIONAL 800 LINE NUMBER MEASURE CUSTOMER NEEDS, REQUIREMENTS, & PERFORMANCE ON A CONTINUING BASIS DEVELOP ACCURATE DATA ON MTBF AND MTTR AS A BASIS FOR NEW PRODUCT PLANNING IMPLEMENT INTEGRATED SYSTEM FOR SERVICE MANAGEMENT CONTROL WITH COMMON DATA BASE
NEED FOR A COMPREHENSIVE PORTFOLIO OF SERVICES TO SUPPORT ALL ASPECTS OF AFTER SALES SUPPORT, INCLUDING TRAINING			
NEED FOR ESTABLISHMENT OF STRATEGIC PRICING APPROACH, BY MARKET SEGMENT			

EXHIBIT III-10

EXTENDED SHIFT COVERAGE PREMIUMS FOR HARDWARE SERVICE

PERCENT PREMIUM ON BMMC			
COVERAGE	MONDAY-FRIDAY	SATURDAY	SUNDAY AND PUBLIC HOLIDAYS
8 Hours	(Base Rate)	+15%	+30%
12 Hours	+10%	+25%	+40%
16 Hours	+20%	+35%	+50%
24 Hours	+40%	+55%	+60%

- Four hour response is usually limited to 50 miles radius of a designated Service Center only.
- Two hour response is usually limited to 25 miles radius of a designated Service Center only.

EXHIBIT III-11

NETWORK CONSULTING SERVICES
CAPTIVE/NON-CAPTIVE, 1983-1988

<u>SERVICE</u>	<u>REVENUES (\$ Millions)</u>		<u>% AAGR</u>
	<u>1983</u>	<u>1988</u>	
<u><u>CAPTIVE SERVICES</u></u>	\$1,040	\$4,663	35%

NON-CAPTIVE SERVICES

Software Development	\$ 75	\$ 360	37%
Consulting	130	1,153	55
Education	5	27	40
FM	-	10	N/A
	<u> </u>	<u> </u>	<u> </u>
Total Network Services	210	1,550	49%
	<u> </u>	<u> </u>	<u> </u>
Total Non-Captive Professional Services	\$6,938	\$15,651	18%
	<u> </u>	<u> </u>	<u> </u>

GRAND TOTAL
Professional
Services

\$7,978\$20,31421%

IV WORD PROCESSING EQUIPMENT

IV WORD PROCESSING EQUIPMENT

A. PRODUCT TYPES

- This area of the marketplace is separated into several levels of products.
 - Standalone word processing systems (dedicated systems).
 - Shared resource systems (dedicated, but shared).
 - Extended editors (terminal based).
- In a standalone environment, the product acts similar to a workstation but incorporates the normal work processing features and operating procedures. Many can also communicate with large systems or other word processors on the network.
- In a shared resource environment, individual users are connected to a central processor and share both disk and printer resources. Log-ons and passwords protect data. Some have both message and electronic mail capability.
- Extended editors are not word processors in the true sense of the word. They are terminals connected to large systems and have no significant local processing power of their own.

- Taken in its broadest sense, the word processing approaches used by the U.S. market today can cover eight different categories of equipment, as shown in Exhibit IV-1. The INPUT estimate of the percentage of the nation's word processing needs processed by the installed base of these eight product categories (and how INPUT sees the load shifting) is included in the exhibit.

B. TECHNOLOGIES USED

- The technologies used for word processing equipment vary, but not to any great extent. The standalone word processing system is generally made up of an electronic or logic section, diskette storage, a detachable keyboard, a power unit, monitor, and printer.
 - The electronic section is generally constructed as either a single mother board containing all the logic circuitry or several logic boards inserted into functionally defined slots. These are normally mounted in the display unit. Current products are using Z80, 8088, or 68,000 chip technology. These boards are not field repairable, and maintenance is performed through board swapping.
 - Diskettes are electrical mechanical devices that may be adjusted but normally are returned to the factory for repairs.
- Detachable keyboards normally are also not field repairable (their cost is generally too low to warrant repair). Some organizations have begun to repair them at field depots.
- Power units are mounted within the display case in several ways; some units have all the power components in one unit that can be removed from the system for depot repair; others are designed for field repair. In most cases, both are repairable at the local field office, and complete power units are replaced mainly to reduce mean time to repair time.

WORD PROCESSING APPROACHES
(AS A PERCENT OF INSTALLED BASE)

M E T H O D U S E D	Y E A R	
	1981	1985
MANUAL AND PORTABLE TYPEWRITERS	10%	12%*
ELECTRIC TYPEWRITERS	72%	40%
ELECTRONIC TYPEWRITERS AND STANDALONE WP WORKSTATIONS	1%	20%
WORD PROCESSING SYSTEM/MULTISTATIONS	10%	9%
MAINFRAME COMPUTER PRINTERS	3%	8%
PERSONAL COMPUTERS	1%	5%
SMALL BUSINESS SYSTEMS	2%	5%
TIME SHARING SERVICES	1%	1%
T O T A L	100%	100%

* INCLUDES PORTABLE ELECTRONIC PCS AND TYPEWRITERS

EXHIBIT IV-2

MAINTENANCE PRICING OF SELECTED VENDORS OF WORD PROCESSORS

VENDOR	MODEL NUMBER	FIRST SHIPPED	AVERAGE PURCHASE PRICE	AVERAGE MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
CPT	8100	1981	\$13,965	\$95	8.2%
IBM	Display Writer	1981	12,360	114.50	11.1
NBI	3000s	1982	13,200	87	7.9
	System 8	1980	22,200	179	9.7
Wang	Wangwriter	1980	6,400	75	14.1
Philips	MICOM 2002	1980	15,870	142	10.7
Xerox	860	1980	12,625	100	9.5

- Monitor maintenance philosophy generally is governed by the unit cost. Several vendors service monitors very successfully in the field. CRTs are the most replaced component within the monitor unit.
- Printers use electromechanical devices that experience wear and changes in adjustments. Their maintenance methods have not changed significantly over the years, and they are almost always serviced on-site. They also require some form of preventive maintenance, which separates a printer's service requirements from the rest of the system. Also several optional printer attachments are available on most systems. These include form feeds and envelope handlers, which are high-maintenance products whose performance criteria is measured by duty cycles (the other components of the system are normally measured by total hours available).
- Shared Resource Systems require a greater maintenance effort. Their architecture is more like those found in the large systems sector. Several display units and printers are connected through cables to a central processing unit. This central processing unit contains an enlarged electronics and logic unit and more sophisticated and larger disk storage devices. Included in these devices are diskette cartridges, fixed disk, and removable 8-inch diskette. The software involved and problem determination is more complex and requires experienced maintenance personnel.

C. TECHNICAL SKILLS REQUIRED

- Since word processing systems are not as modularly constructed as terminals and PCs, the level of expertise required by a field service representative supporting these products must be at a level equal to those maintaining medium to small business systems.

- Basic electronics, mechanical electrical interrelationships, and problem determination skills are a necessity. Although basic electronics can be learned through education institutions, the ability to logically determine failing components and to adjust or replace mechanical devices is learned through experience.
- This is why companies entering the systems service industry hire experienced field service personnel. Entry-level people can be added later, but they require approximately two years to be effective.

D. STARTUP AND ORGANIZATION COSTS

- Startup costs vary greatly depending upon the vendor and maintenance group's relationship. Cost of parts, training, and support are much less when working in cooperation with the product manufacturers. If AT&T desires to work independently of the manufacturer, spares costs generally run three times burdened manufacturing cost, development costs run \$250 per day plus expenses, and support availability is limited. When dealing with vendors like IBM, parts availability is also more difficult, requiring higher stocking levels.
- Word processor systems are marketed and supported by IBM as part of their standard product line. Personal computers are handled in a different manner. It is questionable whether maintaining the IBM word processing system product line is worth the effort.
- Exhibits IV-3 through IV-5 provide an estimate of startup costs for maintaining word processing systems both with vendor involvement and independently.

EXHIBIT IV-3

(INDEPENDENT OPERATION)

FIRST YEAR SET UP AND ORGANIZATIONAL COSTS ESTIMATES AND ASSUMPTIONS

Manpower Requirements

- 1 - Field Service Director
 - 1 - Field Operations Manager
 - 1 - Support Manager
 - 6 - Field Engineers (2 per Location)
 - 3 - Field Administrators (1 per Location)
 - 1 - Logistics Manager
 - 1 - Logistics Planner
 - 1 - Distribution
 - 2 - Instructors
 - 1 - Tech Writer
 - 1 - Tech Support Manager
 - 1 - Support Representative
 - 3 - Headquarters Administrators
-

23 - Total

EXHIBIT IV-4

(INDEPENDENT)

HEADQUARTERS SALARY AND BENEFITS

Director Field Service	\$119,000
Field OPs Manager	89,000
Field Support Manager	71,400
Logistics Manager	53,500
Distribution Clerk	25,500
Logistics Planner	32,000
Instructors (2)	76,000
Tech Writer	38,000
Tech Support Manager	50,000
Tech Support Rep	42,000
Administrators (3)	49,980
	<hr/>
	\$646,380

FIELD SALARY AND BENEFITS

Field Engineers Salary (6)	\$214,000
Field Administrators (3)	51,170
	<hr/>
	\$265,170

EXHIBIT IV-5

OTHER EXPENSE

Transportation Expense	\$ 18,000
Field Facilities	36,000
20% Overtime/Shift	36,000
Training Expense	41,400
Headquarters Facilities	100,000
Training Equipment Exp	76,365
Miscellaneous	50,000
Spares Expense Capitalized over Sixty Months	30,000
Total	<u>\$387,265</u>
Total Yearly Expense	1,299,315

E. PRICE OF SERVICE AVAILABLE

- Word processing is generally serviced through on-site maintenance. The products are not easily transportable, although they can be moved easily within the facility. The more common products being shipped today are shared resource systems consisting of several interconnected units.
- Each unit is priced for maintenance separately but billed on a combined invoice. The average system maintenance price is 9% to 11% of the product purchase price. A standard system maintenance charge is from \$750 to \$900 per month (these are large systems and shouldn't be confused with personal computers).

V PERSONAL COMPUTERS, WORKSTATIONS, AND
INTELLIGENT TERMINALS

V PERSONAL COMPUTERS, WORKSTATIONS, AND INTELLIGENT TERMINALS

A. CATEGORIES OF PRODUCTS

- The differences among these products are rapidly disappearing. At present, the products may be described as follows:
 - Personal computers are standalone products built to use operating systems and data base management routines specifically designed for them. They handle application software in the same manner as any other computer system. They now support multiprocessing, communication, and spooling. IBM's new XT offers the capabilities once only found in large-scale computer systems. It will set the standard for the industry and open up new peripheral product development.
 - Workstations are primarily dedicated application devices with local disk storage and processing capability, usually complemented with good communications capabilities. Their standalone capability varies with the vendor.
 - Intelligent terminals are input/output devices for a central system. They have some local storage and are capable of performing processing that relieves the main processor workload. They are the forerunner of workstations.

B. TECHNOLOGY USED

- The technologies used by all the aforementioned products are similar. Most are based on the 8080, 8088, and 68,000 chip. Intelligent terminals tend to have one large mother board containing all the logic and control circuits.
- Workstations and personal computers generally use several boards inserted into slots; each board handles a particular function. They use a great variety of monitor types, which is further complicated by the number of interconnect schemes. Keyboards also vary between product types and vendors.
- Workstations and personal computers have disk and diskette storage capabilities that are fairly similar; however, the format in which information is stored varies considerably. Almost all provide an RS 232 interface.
- Personal computers and workstations are changing to more modular designs for ease of service. Terminals are generally designed for portability and transportability. Most can be serviced by mail-in or courier maintenance plans.
- Personal computer users currently prefer on-site maintenance, and the products do not lend themselves to mail-in maintenance. It requires technical expertise to swap out boards in the logic unit, replace or adjust diskette and disk drives, and still more expertise to repair and adjust printer equipment. Most monitors, however, are enclosed in a separate housing and can be easily exchanged.
- Many experts predict personal computers will be packaged in such a modular fashion that hardware maintenance as we know it today will disappear. These modules will be so inexpensive that they will be disposable. The maintenance required at that time will become more software support and user assistance oriented.

- A closer look at the PC and workstation modules follows:
- Logic units are enclosed in the same housing as the standard diskette drives. They are generally on boards designed for particular functions. A diskette used for diagnosing errors is normally included in the basic operating system material and tests the function to assist in determining the failing board. These are easily swapped out by the FE and returned for repair to a depot or the vendor.
- The standard diskettes are enclosed in the CPU housing along with the logic unit. They normally are replaced when they malfunction and are serviced in a depot or returned to the vendor.
- Keyboards are treated in a similar manner to those in word processors. They are replaced and discarded due to their low cost.
- Power units are normally enclosed in the CPU housing in one module. They are repaired on-site by some service organizations. This requires a fairly good technician. They can also be removed as a unit and returned to a depot or local field office for repair.
- Most personal computer monitors are easily exchangeable and should be swapped out. These monitors are generally much lower in cost than those found in word processors.
- There is such a variety of printer equipment available on personal computer systems that any single maintenance strategy cannot be used. Each product must be analyzed separately. Most, however, need on-site maintenance. This unit has a higher failure rate than any other part of the PC or workstation. They are all electromechanical devices with several optional attachments.

C. TECHNICAL SKILLS REQUIRED

- The technical expertise required depends on the maintenance strategy followed. If module replacement is adopted for all units except the printer, then the level of experience and expertise of the average field engineer is significantly less. A good electromechanical background and an aptitude for problem determination is adequate.
- Normal training is limited to determining which module is failing and replacing it. Common component replacement can be performed on the failing modules in a local field location by more technically qualified personnel in an unstressful environment.
- The training required for these employees is a "theory-of-operations" course. In short, the FE is taught how to fix it, and the module repair person is taught how it works. This approach appears to be the most logical method to provide service on this product group. Terminals can be serviced either on-site or in the local field office using mail-in, carry-in, or pickup maintenance.
- Field service engineers can be hired through trade schools or recruited from computer dealerships. Several technicians working on television and stereo equipment make excellent component repair engineers. A small percentage of the FEs hired initially should have prior experience. This allows entry level personnel to gain some experience and provide backup support when required.
- The same decisions dealing with vendor involvement and independent operators apply to this product group as to others in the office product sector of the systems business. Operating independently, education, spares, and support require both increased setup time and additional expense.

D. SETUP AND ORGANIZATION COSTS

- Using the unit replacement and local module repair method of repairing equipment, a slightly different corporate structure is required. The handling and repair of spares become critical. The organization takes on more of a manufacturing environment than that of a pure field service group. The support function insures the spares are kept at the latest release level so most fixes are handled by replacing modules or units.
- Corporations, including IBM, who manufacture personal computers are showing reluctance to provide the support normally given to computer products. Because of the volumes being shipped each month, it almost appears to be an unmanageable problem.
- Products being marketed by unauthorized dealers compound the situation. It therefore becomes necessary for independent organizations to fill the gap. Most vendors, including IBM, welcome this participation. What makes this such an opportunity for third-party maintenance groups is the ability to increase volumes within a location by servicing several different vendors' products.
- To insure profitability, third-party or independent maintenance groups must track product performance closely. The number of failures per year should be a major factor in establishing maintenance costs. This should be tracked through incident reports and parts replacement data. In order to plan for servicing any product, performance studies should be made, or future profits may not be realized. This should be handled by the support group.
- Education is also dealt with differently in a high-volume market. As much training as possible must be done locally or through a local independent education group. Any courses generated by the corporation should be done using video training methods, which are continually available at the field loca-

tions. The cost of developing these courses is initially higher than the traditional lecture/lab method; however, the training expenses saved by eliminating travel and living expenses more than pay for it.

- Also, such training methods are available on demand in large quantities for the life of the product. A more experienced individual is necessary to write these courses. He should have a complete technical background including the use of CAI and video products. If needed, independent education organizations can provide this service.
- Most maintenance documentation can be purchased locally, eliminating the need for a documentation group.
- The director of field service must be experienced in all areas of the system business and must be an expert in logistics and high-volume product service methods. They differ greatly from the large-system sector and require a different management philosophy.
- The average field service engineer makes a total of four calls per day in the personal computer and workstation area of the business. The response time being experienced by most users is three days. This provides a lot of room for improvement. However, the capability of FEs to increase their productivity is limited. When making initial manpower forecasts, four calls per day is probably correct.

E. PRICING OF MAINTENANCE

- A personal computer system consisting of a monitor, CPU, two diskettes, keyboard, and printer costs \$500 per year for on-site maintenance. They also are handled on a time and materials basis with the hourly rate of \$80 per hour fairly standard.

- A comparison of IBM's pricing of the PC maintenance, by delivery method, is provided in Exhibits V-1 through V-3.
 - Workstations are also generally serviced on-site with maintenance charges of \$350 to \$500 fairly typical.
 - Intelligent terminals are serviced on-site, mail-in, courier, and carry-in. On-site charges are on the average \$350 per year, carry-in/mail-in costs \$200, and courier runs \$230 per year.

IBM PC

Qty.	Product		(dollars)		
	Code	Description	Purchase Price	Carry-in	Mail-in
1	5150	CPU, 64KB, Keyboard	\$1,575.00	\$106.00	\$92.50
1	5151	Monochrome Display & Card	680.00	28.00	24.50
2	3907	5 1/4 Single- side Floppy	1,058.00	75.00	65.00
1	5152	80 cps Matrix Printer	595.00	40.00	35.00
Total			\$3,908.00	\$249.00 6.4%	\$217.00 5.6%

INPUT

IBM PC

Qty.	Product		(dollars)		
	Code	Description	Purchase Price	Courier	On-site
1	5150	CPU, 64KB, Keyboard	\$1,575.00	\$132.00	\$165.00
1	5151	Monochrome Display & Card	680.00	35.00	44.00
2	3907	5 1/4 Single-side Floppy	1,058.00	93.00	116.00
1	5152	80 cps Matrix Printer	595.00	50.00	62.50
Total			\$3,908.00	\$310.00 7.9%	\$387.50 9.9%

INPUT

ON-SITE SERVICE PRICING ON IBM PC 1983

Product		Compu- terland	IBM	IBM Price Advantage (percent)
5150	CPU, 64KB, Keyboard	\$189.00	\$165.00	(14.5%)
5151	Monochrome Display & Card	81.60	44.00	85.5
3907	5 1/4 Single-sided Floppy (2)	126.96	116.00	9.4
5152	80 cps Matrix Printer	97.50	62.50	56.0
Total		\$495.06	\$387.50	(27.8%)

INPUT

EXHIBIT V-4

MAINTENANCE PRICING OF SELECTED VENDORS OF TERMINALS

VENDOR	MODEL NUMBER	PRODUCT DESCRIPTION	FIRST SHIPPED	PURCHASE PRICE	MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
CDC	751-10	CRT	1979	\$1,995	\$30	18.1
Honeywell	VIP-7100	CRT	1976	1,500	23	18.4
IBM	3278 2A	CRT	1978	2,505	22.50	10.8
IBM	3279 2C	Color CRT	1978	4,525	39.50	10.5
Univac	UTS-20	CRT	1980	\$2,597	28	12.9

EXHIBIT V-5

(INDEPENDENT OF VENDORS)

PERSONAL COMPUTER START UP COST ESTIMATES

Manpower Requirements

- 1 - Field Service Director
- 1 - Field Operations Manager
- 1 - Logistics Manager
- 1 - Support Manager
- 1 - Administrative Manager
- 2 - Secretary (2)
- 1 - Logistics Planner
- 1 - Distribution Representative
- 2 - Instructors (2)
- 2 - Support Reps (2)
- 15 - Field Engineers
- 6 - Component Repair Technicians
- 6 - Administrators

Other Requirements

- 3 - Field Facilities
- 1 - Headquarters Facilities, Test Equipment, Spares 7% Level

EXHIBIT V-6

(INDEPENDENT OF VENDORS)

PERSONAL COMPUTER START-UP COST ESTIMATES

Headquarters Salary and Benefits

Field Service Director	\$119,000
Field Operations Manager	89,000
Logistics Manager	75,000
Support Manager	70,000
Administrative Manager	38,000
Secretary (2)	28,500
Logistics Planner	38,000
Distribution Representative	28,500
Instructors (2)	95,200
Support Reps (2)	57,120
	<hr/>
Yearly Total	\$638,320

Field Salary and Benefits

Field Engineers (15)	\$499,840
Component Tech (6)	228,480
Field Administrators (6)	102,816
	<hr/>
Yearly Total	\$831,136

EXHIBIT V-7

(INDEPENDENT OF VENDOR)

OTHER EXPENSES

Field Facilities	\$180,000
Test Equipment (Cap. 5 Years)	12,000
Headquarter Facilities	100,000
Spares 7% First Year (Cap. over 5 Years)	168,000
Video and CAI Courses	120,000
Miscellaneous	75,000
	<hr/>
Yearly Total	\$655,000
Yearly Total Expenses	\$2,124,456

-
- Working in cooperation with the vendors reduce the requirement for component repair and spares costs only.

Vendor Contract Savings

New Component Tech.	\$ 114,240
New Spares Cost (Capitalized over 5 Years)	67,200
	<hr/>
New Yearly Total	\$1,909,416

VI COMMERCIAL APPLICATION MINICOMPUTERS

VI COMMERCIAL APPLICATION MINICOMPUTERS

A. CATEGORIES OF PRODUCTS

- The main categories of product found in the office area are:
 - Business application processing minis.
 - Office application processing minis.
 - Energy management handling minis.
- The business application mini is no different from the small business computer system other than in the functional capability and design of the system itself. The minicomputer was originally designed to handle real-time data capture from both analog and digital sources, principally for the scientific, engineering, military, and education sectors. Its low cost (which has yet to stop dropping) brought it into the business data processing market, for which it was not designed, and is now bringing it into the office application market. Some shared word processors are minicomputer based (e.g., CPT).
- Energy management minis began as load monitoring and environment control systems and have extended their capabilities to message handling and accounting. Much of their market is now under attack from dedicated micro-computers.

B. TECHNOLOGY USED

- The minicomputer logic unit, processor, and memory are similar to those found in other computer products. Physically, they are composed of a back plane, bus, 19-inch rack, and a series of boards, the function of which can vary from memory to I/O logic to logic. Many have customized circuitry to satisfy particular needs, including floating point, compatibility features, and operating system code.
- With the exception of the CPU described above, the peripheral technologies are described in the appropriate section ("peripherals" section).

C. TECHNICAL SKILLS NEEDED

- As throughout the remainder of this report, we must distinguish between the technical skills needed for in-field maintenance (increasingly oriented toward remotely assisted diagnostics, board swapping, and limited on-site repair) and repair (usually concentrated in repair centers). On the one hand, the needed technical stability is limited to understanding how the hardware and software components handle functional ability (and therefore where the failure is likely to reside), and on the other hand, highly specialized engineering ability is needed to determine which component or circuit has failed and if and how it can be repaired.
- This has determined that most repair centers specialize their engineering staff into subsystems: disk drive specialists, printer specialists, and logic circuitry specialists, etc., who rarely meet with clients. The skills needed by the repair center are almost at the opposite end of the skill spectrum from those of the field engineer.

D. ORGANIZATIONAL COST

- The models provided for word processor service organizations apply to mini-computers: service oriented toward on-site service to the base. The principal difficulties with offering TPM service for the minicomputer base are that:
 - Minicomputer vendors are beginning to offer single-source maintenance for their own products (eliminating the enticement to TPM vendors).
 - TPM vendors are already established, and the competition is strong.

E. PRICING OF SERVICE

- The accepted industry norms for pricing are shown in Exhibits VI-1 and VI-2.

EXHIBIT VI-1

MAINTENANCE PRICING OF SELECTED VENDORS OF SMALL BUSINESS
AND MINICOMPUTER SYSTEMS UNDER \$25,000

VENDOR	MODEL NUMBER	MEMORY SIZE OF BASIC CONFIGURATION	FIRST SHIPPED	AVERAGE PURCHASE PRICE	AVERAGE MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
IBM	System /32	8 KB	1975	\$23,490	\$168	8.6%
Texas Instruments	DS 990	64 KB	1979	9,995	114	13.7
Wang	VS-100	256 KB	1977	22,000	235	12.8
Basic Four	System 200	40 KB	1978	24,990	260	12.5
Burroughs	B 90	128 KB	1979	7,900	56	8.5
NCR	8150	32 KB	1978	18,300	192	12.6
Hewlett Packard	3000/30	256 KB	1979	24,925	220	10.6
DEC	Data System 336	128 KB	1980	25,000	242	11.6

EXHIBIT VI-2

MAINTENANCE PRICING OF SELECTED VENDORS OF SMALL BUSINESS COMPUTERS
AND MINICOMPUTERS OVER \$25,000

VENDOR	MODEL NUMBER	MEMORY SIZE OF BASIC CONFIGURATION	FIRST SHIPPED	AVERAGE PURCHASE PRICE	AVERAGE MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
Data General	CS-50 Model C5	128 KB	1980	\$37,000	\$262	8.5%
Data Point	8630	256 KB	1981	33,500	240	8.6
DEC	Data System 356	256 KB	1980	41,900	288	10.6
Hewlett Packard	3000/40 SX	256 KB	1982	42,100	320	9.1
Honeywell	DPS 6/48	512 KB	1981	116,060	814	8.4
IBM	System 38 Model 03 21	512 KB	1980	59,210	358	7.3
Perkin-Elmer	8/32	1 MB	1978	100,000	750	9.0
Prime	150/II	256 KB	1981	54,000	272	6.0

VII NETWORK-BASED SERVICES

VII NETWORK-BASED SERVICES

A. CATEGORIES OF SERVICES

- Electronic mail requires a central system that is available 24 hours a day. Mail must be password protected, numbered, show proof of receipt, and remain stored for a specific period of time.
 - MCI is now providing central-site capability for personal computer users. In the future several organizations, including the postal service, are planning to provide those services.
 - Large systems have provided mail capability for users for several years. These services have significantly reduced mail costs, but more important they provide instant access to mail. The effect of this capability on companies like Western Union and others will be felt in the coming years.
 - In order to provide electronic mail and facsimile service, very large data storage must be available. Most organizations constantly increase the size of the storage space used to store mail. This limits use of this service to large data storage systems. The personal computer and word processing systems currently available are not large enough to efficiently provide this service.

- Facsimile devices will be replaced by the technology allowing copies and other devices to communicate directly across a local area network. These local area networks also have modems attached, which allows them to communicate to other locations. The use of local area networks opens up a whole new area requiring new approaches to maintenance.

B. TECHNOLOGIES USED

- Until the introduction of local area network services, devices were connected to the central processor via a unique cable. The central processor handled all the routing throughout the network. With LAN services the devices are all connected to the same cable. Protocol formats and device addresses identify them. The central processor becomes just another device.
- This technology will require drastic alteration of maintenance strategies. The network itself becomes a critical part of the system. Devices, such as repeater and protocol identifiers, require service. Each device will also enhance its processing capability to make more efficient use of the network.
- The technology used is all electronic. LSI, VLSI, and fiber optics make up the majority of the components used. Disk storage devices will be attached directly to the network for shared use. Printers, copiers, and terminal devices will directly communicate with each other. The problem determination capabilities required to service these products will forge a retraining effort on all vendors' parts.

C. TECHNICAL SKILLS NEEDED

- There are very few field engineers with extensive experience in maintaining communications equipment as complex as those being developed. This equipment has extensive diagnostic routines built in, but network lockouts are going to create tough problems to correct.
- IBM, Wang, and Xerox have training programs in place to handle this new technology. For other vendors to compete successfully, an investment in education is necessary. This investment will be considerable.
- The technical skills required to handle these products are advanced electronics, telecommunication methods, software support experience, and problem determination experience.

D. ORGANIZATION AND SETUP

- For any organization to start up just to handle this section of the business is not recommended. The cost to hire qualified field engineers and provide the education and support necessary is prohibitive. Also, the tools and test equipment required is expensive.
- Once an organization is fully operational handling equipment connected to local area networks, then the resources must be invested to support the network itself. The units themselves should not become more difficult to maintain as internal diagnostics should identify problems.
- The previous organizational charts should continue to hold true for equipment used in telecommunications.

E. PRICING FOR MAINTENANCE

- Maintenance pricing is difficult to determine on products like electronic mail. They are usually provided with the system and are included in the system maintenance price.
- Network maintenance pricing is normally negotiated similarly to the method used for maintenance management contracts. It is normally based on terms and conditions as well as on the products involved.

VIII TERMINAL PRODUCTS

VIII TERMINAL PRODUCTS

A. PRODUCT TYPES

- Terminal products have created more employer involvement with the data processing equipment installed within a business than any other product. They vary from small portable modules to large, bulky units. Some have removable keyboards, others are built in. They are relatively inexpensive and are very reliable.
- Terminals can be found everywhere and are installed in varied environments that force them to operate in areas where former products would be prohibited. They also bring remote areas closer to a central site for large data distribution.
- Terminals are designed to communicate with specific mainframes; therefore, when selecting products to maintain, a major decision factor is the number of systems a particular manufacturer has installed.
- Maintenance rates are generally low because of their reliability and volumes installed in a single location. Most are portable and easily swapped out.
- For any organization to set up just to maintain terminals is not recommended. They can add significant revenues to a service organization, but cannot carry one alone. They are also being replaced by workstations and personal computers.

B. TECHNOLOGY USED

- Their are several generations of terminals still in use. Earlier models used TTL and ECL logic; new products use LSI and VLSI technology.
- Many terminals are packaged for appearance and cost. Their serviceability is not as much a factor as in the case of PCs and word processors. In most cases the entire unit is swapped out and the terminal worked on off-line.
- Repair of some of these products requires a complete disassembly to replace a failing component. They are generally composed of a power unit logic, monitor ASM and keyboard. The interconnect schemes used vary, so spares that may be compatible with different vendors are not useable.
- When third-party maintenance organizations use other than recommended spares, they open themselves to several legal ramifications. UL approval for radiation and leakage standards must be accomplished. Also, monitor ergonomic specifications must be met. Several labor union groups are looking closely at this product for detrimental effects on their constituents.
- Since these products are connected to a main processor, clear definitions of service responsibilities must be understood by all concerned. As local area network technology becomes more prevalent, this area will become more critical.

C. TECHNICAL SKILLS REQUIRED

- Before determining the skills FEs require to maintain terminal products, the maintenance philosophy of supporting these products should be discussed. On-site maintenance can be defined as repairing the unit at the site or carrying a spare unit and swapping it out.

- If on-site repair is chosen, the expertise needed is rather extensive. A heavy background and mechanical dexterity are required.
- If units are swapped out, a minimum of electronic expertise is needed. Just disconnecting the unit and making a replacement is required. Also, a knowledge of computer operations is helpful.
- The use of component techs at the local office, as in the case of PCs and workstations, is essential. This is where the maintenance expertise is needed.

D. ORGANIZATION SETUP COSTS

- The wisdom of setting up an organization to service only terminals is questionable. It can bring increased revenues to organizations servicing PCs, workstations, and word processors, but cannot support itself. Many users are purchasing their own spare units for swap out and gambling on time and material charges at repair centers. IBM charges only \$80 per year to maintain their small 3101 terminal - using repair center maintenance. To compete in this marketplace alone is very risky.
- When a corporation is set up to repair both PCs and word processors, then it has already paid the cost of setting up a repair center. To include terminal maintenance in their offerings make sense.
- The main additional cost is in spares, based on a 5% sparing level, operating independent of vendors.
- These component techs should have a high level of electronic background and have similar abilities to that of an engineering tech or TV repair person.

- The training required for field personnel is basically OJT type and conducted in the local office. Video tapes and CAI packages can be used for computer operation courses. Several are available.
- Trade schools are an excellent source of hire for FE personnel who provide pick-up or swap-out service.

E. PRICES OF SERVICE

- On-site, carry-in, pick-up, deferred maintenance, and mail-in are all viable maintenance offerings for terminal products. Maintenance pricing has become very competitive with volume discounts and other discounting schemes prevalent.
- On-site maintenance for terminal products average \$22 per month, with volume discounts based on reduced travel costs. This reduces to \$17 per month.
- Prices for mail-in repair range from \$80 to \$120 per year for those vendors surveyed.
- Courier or pick-up range from \$15 to \$20 per month.
- Mail-in and pick-up require that the user supply spare units.
- Sparing costs would be \$65 per unit maintained. Operating with the vendor would result in a cost of \$26 per unit maintained. Labor costs per repair should run about \$65 per hour burdened.
- These repair centers could also handle other product lines such as home computers and telephone equipment.

IX PERIPHERAL PRODUCTS

IX PERIPHERAL PRODUCTS

A. CATEGORIES OF PRODUCTS

- Within the office product area of the system business, the main peripheral products are disk storage devices and a selection of printers.
- Word processing equipment uses various peripheral devices. The variety of disk and diskettes is constantly increasing. Both use 5" and 8" single diskette drives and diskette cartridge drives that select a diskette from a cartridge containing up to 8. They also use fixed and removable hard disk. There are normally a combination of these products on a single shared resource word processing system. The printers used are generally letter quality printers. Printers being shipped in the near future will be laser printers and should speed up the printing process and increase the productivity of the whole system.
- Personal computers also use several forms of disk equipment. Diskette drives are the main storage devices used currently, but hard disk installs are growing rapidly. Printers used are either letter quality or dot matrix.
- Printers can encompass several options and attachments. Standard form feeds, continuous forms, envelope handlers, and label writers are but a few. Multicolored printers for handling graphics are also becoming popular.

- Most of these products are portable but normally remain in a single location within the user's facilities. Through the use of spooling, high-speed printers will soon be commonplace in the office. Word processing requires the fastest printing possible and should be the first to incorporate these large printer systems.
- With the advent of local area networks, links to almost any output or storage device will become normal. Graphics can be transmitted to a copier or other graphic output device.

B. TECHNOLOGIES USED

- Disk and diskette drives are electro-mechanical devices that require adjustment and replacement. Some disk devices are being developed with a control or logic unit using technology similar to that found within the computers themselves. This allows the central processor to continue processing while information is being outputted or retrieved. As we move into multiprocessing in the PC marketplace, this will become commonplace.
- Printers are also electro-mechanical devices requiring adjustment and parts replacement, but also need preventative maintenance periodically. They also are being connected to control units to allow multiusers.
- Daisy wheel print elements are used in many letter quality printers. These provide high-quality output but are very slow.

C. TECHNICAL SKILLS REQUIRED

- A strong electro-mechanical background with an understanding of timing relationships is necessary. This is usually a talent people develop through experience.
- Training is conducted in a lab environment having the students perform disassembly and assembly as well as adjustments.
- The field engineers hired should work on all office products. The skills necessary for handling the complete personal computer and workstation line are common to the needs for peripheral maintenance.
- Trade schools and computer distributors are a good source of employees as are previously experienced FEs.

D. ORGANIZATION AND SETUP COSTS

- In the office product area of the systems business, peripherals are treated as part of the system. It is not like the large system sector where users accept two groups supporting their products. All the organizational costs for supporting peripherals were included in system cost estimates.

E. PRICE FOR MAINTENANCE

- The maintenance prices for printers vary depending on their size and function. On word processors they can run from \$29 to \$65 a month.

EXHIBIT IX-1

MAINTENANCE PRICING OF SELECTED VENDORS OF TAPE AND DISK DRIVES

VENDOR	MODEL NUMBER	PRODUCT DESCRIPTION	FIRST SHIPPED	PURCHASE PRICE	MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
Honeywell	MTU 0610	Tape	1980	\$21,000	122	7.0
Honeywell	MSU 0501	Disk	1979	49,650	197	4.8
CDC	858/11	Disk	1980	59,900	166	3.3
CDC	679-6	Tape	1978	31,540	134	5.1
STC	3670	Tape	1974	26,312	343	15.6
STC	8650 A2	Disk	1979	60,880	251	5.0
IBM	3370 A1	Disk	1978	29,550	94.50	3.8
Univac	8470	Disk	1979	87,200	327	4.5

EXHIBIT IX-2

MAINTENANCE PRICING OF SELECTED VENDORS OF FAST PRINTERS

VENDOR	MODEL NUMBER	PRODUCT DESCRIPTION	FIRST SHIPPED	PURCHASE PRICE	MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
IBM	1403 NI	1100 lpm	1978	\$ 40,040	625	18.7
IBM	3800	Up To 20,040 lpm	1978	373,150	938	3.0
CDC	580/200	2000 lpm	1977	91,956	797	10.4
Honeywell	PPS II/E	18,000 lpm	1981	240,745	1,697	8.5
Honeywell	PRU 1600	1600 lpm	1974	\$ 64,940	1,538	28.4

- Diskettes are normally included in the maintenance price for the system. The price varies depending on the model of personal computers. Diskettes are relatively high-maintenance items. Hard disks are extremely reliable and require little service.

X SOFTWARE MAINTENANCE

X SOFTWARE MAINTENANCE

A. PRODUCT CATEGORIES

- The principal software product maintenance categories are as follows:
 - System software (operating systems, languages, and utility software).
 - Application software products from equipment vendor.
 - Application software products from third party.
- System software maintenance is increasingly billed as an additional line item on the hardware maintenance invoice, and the function is being integrated into hardware support. As a result, much of the market for this maintenance revenue is captive.
- Application software maintenance is inadequately priced (at about 50% of what the market will bear). The range of software services available is also below what the market requires. However, the software maintenance revenue will increasingly be bundled into the hardware.
- Third-party applications include custom-developed software and application products from the software houses for hardware not of their own manufacture.

B. SERVICE PRICING BY CATEGORY

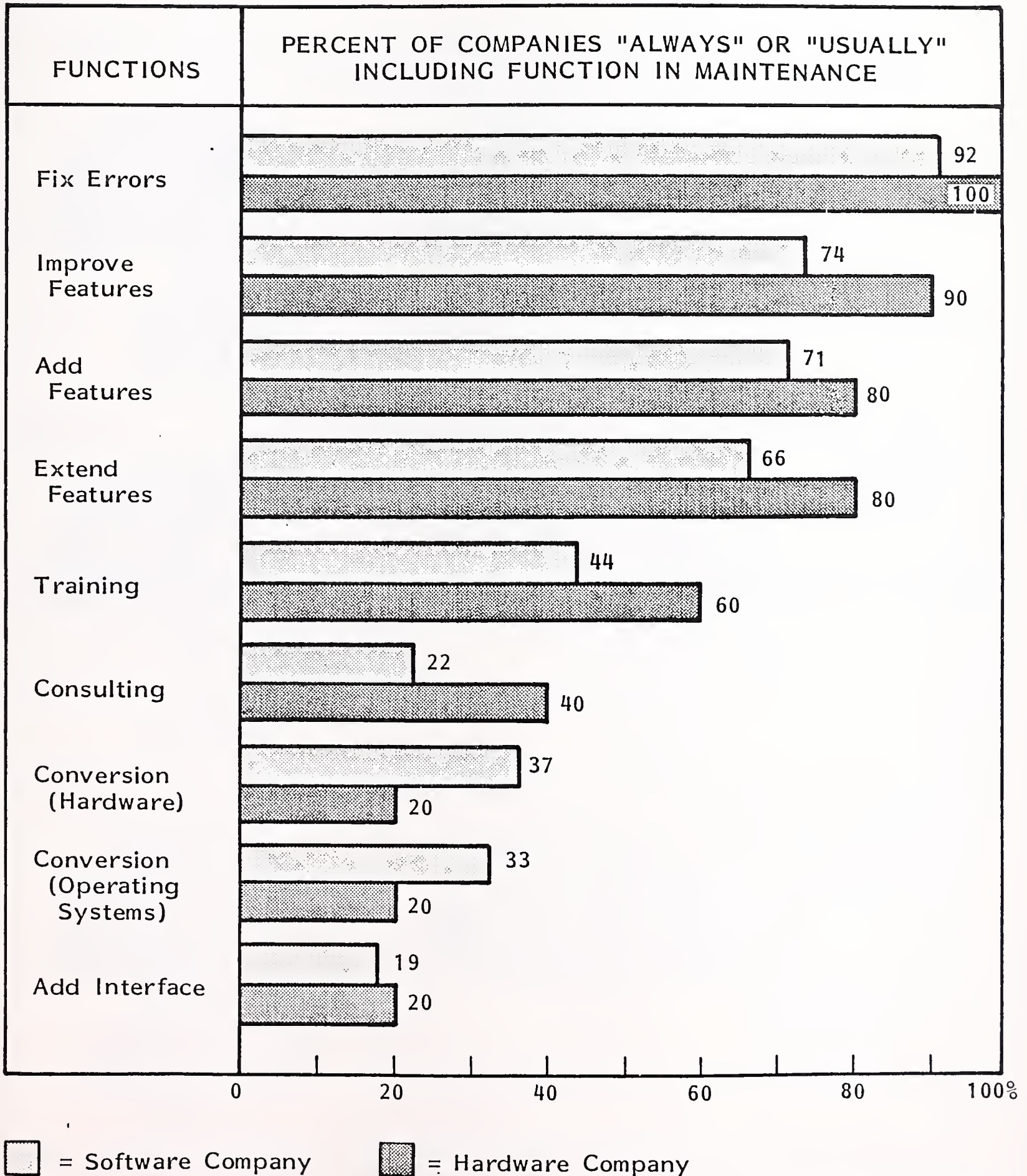
- There are no industry norms to guide vendors in setting software maintenance prices. This is indicated by the spread of maintenance charges being levied today: from 10% to 25% of the purchase price per annum. This normally covers on-site service, one shift, five days a week. There are rarely any extensions offered.
- It is likely that this picture will not change rapidly but will continue to evolve slowly (in a pattern reminiscent of hardware maintenance in the 1960s). The functions contained in software maintenance are also ill defined, as shown by Exhibit X-1, with many basic maintenance functions not included in the maintenance charge.

C. TECHNOLOGIES USED

- This section is not applicable to the majority of software products currently, but this is likely to change as increasing amounts of systems software and application software are delivered in firmware. At that time it may be necessary to change the software board.
- One other possibility is raised by the trend shown in Exhibit X-2. If most vendors are considering using telecommunications as the means to diagnose failures, then the possibility exists of downline loading software patches with no on-site visit.

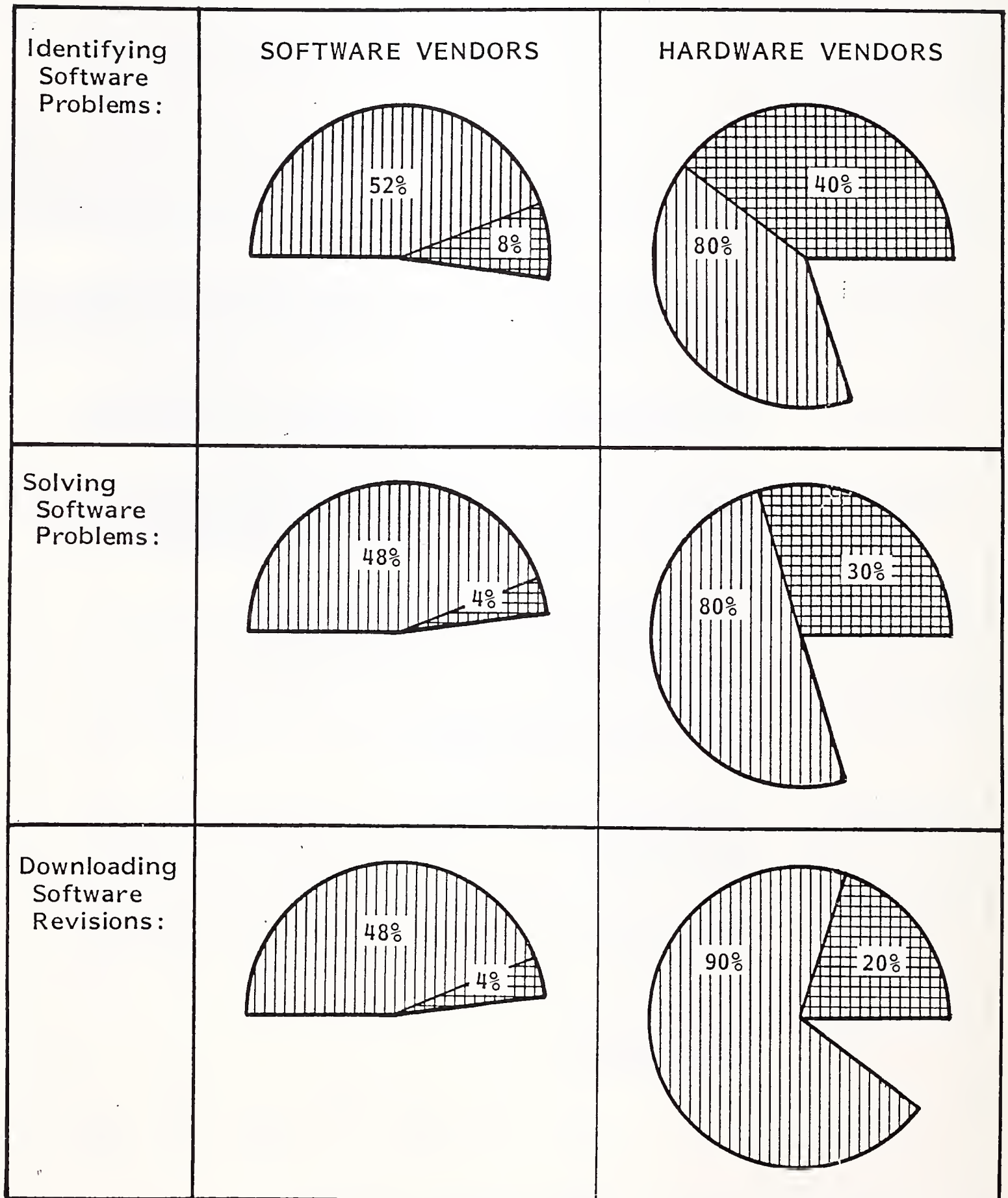
EXHIBIT X-1

FUNCTIONS INCLUDED IN VENDOR MAINTENANCE SOFTWARE



SOURCE: INPUT Survey

EXHIBIT X-2
PERCENT OF VENDORS USING AND PLANNING TO USE
TELECOMMUNICATIONS IN SOFTWARE MAINTENANCE



= Now

= Future

Note: Percents refer to vendor "always" or "usually" using or planning to use

D. TECHNICIAN SKILLS NEEDED

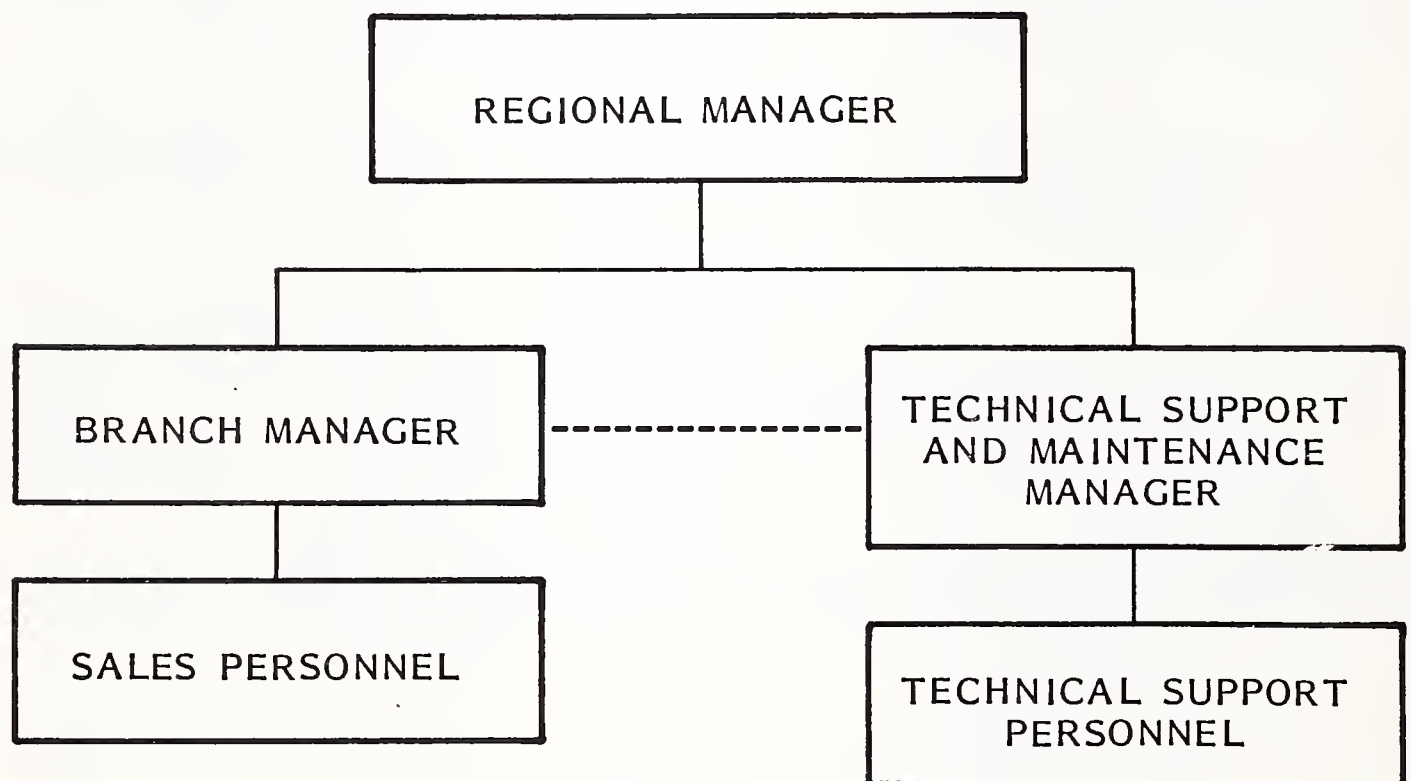
- The essential skills are once again divided into two groups:
 - Support staff: to interface with the customer, define the problem and relate the failure to a given subset of the software system/product.
 - Software engineers: to examine the code, make changes, test modified systems/products and deliver the changes to the support staff for distribution.
- This is a replica of the kind of hardware maintenance organization that many vendors are moving toward.

E. ORGANIZATIONAL STRUCTURE

- The typical software support organization in a hardware company is shown in Exhibit X-3.

EXHIBIT X-3

SOFTWARE FIELD SUPPORT ORGANIZATION
IN A TYPICAL HARDWARE COMPANY



APPENDIX A: SERVICE REVENUE FORECASTS

EXHIBIT A-1

HOME COMPUTER REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>\$ Millions</u>		Percent <u>AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Hardware shipments	\$ 1,200	\$ 2,300	14%
-	Software sales	150	2,000	68
-	After-sales support	<u>60</u>	<u>180</u>	<u>25</u>
	TOTAL	\$ <u>1,410</u>	\$ <u>4,480</u>	<u>26%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 10	\$ 100	58%
-	Education	5	15	25
-	Over-the-counter parts	<u>45</u>	<u>50</u>	<u>2</u>
	TOTAL	\$ <u>60</u>	\$ <u>165</u>	<u>22%</u>
3.	<u>SOFTWARE SUPPORT</u>			
-	Maintenance	*	\$ 5	NA
-	Education	*	10	NA
-	Installation	<u>*</u>	<u>*</u>	<u>NA</u>
	TOTAL	<u>*</u>	\$ <u>15</u>	<u>NA</u>
* Negligible				

EXHIBIT A-2

BUSINESS PC REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>\$ Millions</u>		<u>Percent AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Hardware shipments	\$ 2,605	\$ 6,340	19%
-	Software sales	548	2,457	35
-	After-sales support	<u>375</u>	<u>1,250</u>	<u>28</u>
	TOTAL	\$ <u>3,528</u>	\$ <u>10,047</u>	<u>23%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 100	\$ 400	32%
-	Education	5	30	43
-	Over-the-counter parts	<u>260</u>	<u>750</u>	<u>24</u>
	TOTAL	\$ <u>365</u>	\$ <u>1,180</u>	<u>26%</u>
3.	<u>SOFTWARE SUPPORT</u>			
-	Maintenance	*	\$ 20	NA
-	Education	10	50	38
-	Installation	<u>*</u>	<u>*</u>	<u>NA</u>
	TOTAL	\$ <u>10</u>	\$ <u>70</u>	<u>48%</u>
	* Negligible			

EXHIBIT A-3

WORKSTATIONS REVENUES 1982-1987

1. <u>REVENUE FORECAST</u>		<u>\$ Millions</u>		
	<u>1982</u>	<u>1987</u>		<u>Percent AAGR</u>
- Hardware shipments	\$ 1,610	\$ 5,980		30%
- Software sales	100	200		15
- After-sales support	<u>185</u>	<u>695</u>		<u>30</u>
TOTAL	\$ <u>1,895</u>	\$ <u>6,605</u>		<u>28%</u>
2. <u>HARDWARE SUPPORT</u>				
- Maintenance	\$ 135	\$ 500		30%
- Education	*	*		*
- Over-the-counter parts	<u>40</u>	<u>140</u>		<u>28</u>
TOTAL	\$ <u>175</u>	\$ <u>640</u>		<u>29%</u>
3. <u>SOFTWARE SUPPORT</u>				
- Maintenance	\$ 10	\$ 45		35%
- Education	*	5		NA
- Installation	<u>*</u>	<u>5</u>		<u>NA</u>
TOTAL	\$ <u>10</u>	\$ <u>55</u>		<u>41%</u>
* Negligible				

EXHIBIT A-4

MINICOMPUTER REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>\$ Millions</u>		<u>Percent AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Small business system shipments	\$ 2,585	\$ 6,990	22%
-	Minicomputer system shipments	5,580	17,000	25
-	Software sales	1,630	6,000	30
-	After-sales support	<u>1,705</u>	<u>4,970</u>	<u>18</u>
	TOTAL	\$ <u>11,500</u>	\$ <u>34,960</u>	<u>25%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 1,220	\$ 3,400	23%
-	Education	25	75	25
-	Over-the-counter parts	<u>230</u>	<u>700</u>	<u>25</u>
	TOTAL	\$ <u>1,475</u>	\$ <u>4,175</u>	<u>23%</u>
3.	<u>SOFTWARE SUPPORT</u>			
-	Maintenance	\$ 215	\$ 740	28%
-	Education	*	*	NA
-	Installation	<u>15</u>	<u>55</u>	<u>30</u>
	TOTAL	\$ <u>230</u>	\$ <u>795</u>	<u>28%</u>
*	Negligible			

EXHIBIT A-5

DISPLAY REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>\$ Millions</u>		Percent <u>AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Hardware shipments	\$ 2,628	\$ 7,700	24%
-	After-sales support.	<u>735</u>	<u>2,156</u>	<u>24</u>
	TOTAL	\$ <u>3,363</u>	\$ <u>9,856</u>	<u>24%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 555	\$ 1,574	23%
-	Education	(included in systems, when available)		
-	Over-the-counter parts	<u>180</u>	<u>582</u>	<u>26</u>
	TOTAL	\$ <u>735</u>	\$ <u>2,156</u>	<u>24%</u>
3.	<u>SOFTWARE SUPPORT</u>			
		(none)		

EXHIBIT A-6

PRINTER/COPIER/PLOTTER REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>Shipments (\$ millions)</u>		<u>Percent AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Printer	\$ 2,950	\$ 9,000	25%
-	Plotter	1,300	4,300	27
-	Copier	3,100	7,400	19
-	After-sales support	<u>850</u>	<u>2,700</u>	<u>26</u>
	TOTAL	\$ <u>8,200</u>	\$ <u>23,400</u>	<u>23%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 680	\$ 2,140	26%
-	Education	*	*	NA
-	Over-the-counter parts	<u>170</u>	<u>560</u>	<u>27</u>
	TOTAL	\$ <u>850</u>	\$ <u>2,700</u>	<u>26%</u>
*	Negligible			

EXHIBIT A-7

TYPEWRITERS/WORD PROCESSORS REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>\$ Millions</u>		Percent <u>AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Hardware shipments	\$ 3,712	\$ 10,000	22%
-	Software sales	30	140	35
-	After-sales support	<u>1,580</u>	<u>3,930</u>	<u>20</u>
	TOTAL	\$ <u>5,322</u>	\$ <u>14,070</u>	<u>21%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 1,440	\$ 3,583	20%
-	Education	10	27	22
-	Over-the-counter parts	<u>120</u>	<u>270</u>	<u>18</u>
	TOTAL	\$ <u>1,570</u>	\$ <u>3,880</u>	<u>20%</u>
3.	<u>SOFTWARE SUPPORT</u>			
-	Maintenance	\$ 10	\$ 45	35%
-	Education	*	*	NA
-	Installation	<u>*</u>	<u>5</u>	<u>NA</u>
	TOTAL	\$ <u>10</u>	\$ <u>50</u>	<u>38%</u>
*	Negligible			

EXHIBIT A-8

TELECOMMUNICATIONS EQUIPMENT REVENUES 1982-1987

1.	<u>REVENUE FORECAST</u>	<u>\$ Millions</u>		Percent <u>AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Hardware shipments			
.	Digital data switches	\$ 1,920	\$ 3,700	14%
.	Front-end processors	725	1,460	15
.	Modems and couplers	525	1,200	18
.	Facsimile	205	415	15
.	Teleprinters	225	120	(12)
.	Earth stations	510	1,220	19
.	Other (LAN, protocol converters)	<u>70</u>	<u>175</u>	<u>20</u>
	TOTAL	\$ <u>4,180</u>	\$ <u>8,290</u>	<u>15%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 360	\$ 725	15%
-	Education	-	-	-
-	Over-the-counter parts	<u>40</u>	<u>70</u>	<u>12</u>
	TOTAL	\$ <u>400</u>	\$ <u>795</u>	<u>15%</u>
3.	<u>SOFTWARE SUPPORT</u>			
-	Usually counted in the system to which the telecommunications equipment is connected.			

EXHIBIT A-9

PERIPHERAL REVENUES 1982-1987

1.	<u>SHIPMENTS</u>	<u>\$ Millions</u>		Percent <u>AAGR</u>
		<u>1982</u>	<u>1987</u>	
-	Back-end processors	\$ 45	\$ 650	70%
-	Floppy disk drives	2,300	6,400	23
-	Disk drives	3,800	10,300	22
-	Tape drives	2,100	5,200	20
-	After-sales support	<u>1,290</u>	<u>2,950</u>	<u>18</u>
	TOTAL	\$ <u>9,535</u>	\$ <u>25,500</u>	<u>22%</u>
2.	<u>HARDWARE SUPPORT</u>			
-	Maintenance	\$ 1,090	\$ 2,400	17%
-	Education	*	*	NA
-	Over-the-counter parts	<u>200</u>	<u>550</u>	<u>22</u>
	TOTAL	\$ <u>1,290</u>	\$ <u>2,950</u>	<u>18%</u>
3.	<u>SOFTWARE SUPPORT</u>			
		(Negligible)		

* Negligible

APPENDIX B: COMPANY PROFILES

COMPANY PROFILE

GENERAL ELECTRIC INFORMATION SERVICES COMPANY (GEISCO)

401 North Washington Street
Rockville, MD 20850

Telephone: (301) 340-4000

President: Walter W. Williams

Status: Wholly owned subsidiary of
General Electric

Year Founded: 1964

Fiscal Year End: December 31

PERFORMANCE

<u>(Estimates)</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Revenue (\$ millions)	\$256	\$320	\$390	\$475	\$550
Percent growth	25%	25%	22%	22%	16%
Net Income (\$ millions)	\$ 36	\$ 48	\$ 58	\$ 76	\$ 88
Percent growth	30%	33%	21%	31%	16%

BUSINESS MIX

<u>1982 Sources of Revenue</u>	<u>\$ millions</u>	<u>Percent</u>	<u>Industry</u>	<u>Percent</u>
Processing services	\$424	77%	General business	30%
Professional services	83	15	Manufacturing	35
Software products	33	6	Banking and Finance	12
Turnkey systems	10	2	Energy/Petroleum	10
	<u>\$550</u>		Distribution	9
			Other	4

GOALS & OBJECTIVES

GEISCO aims to achieve \$1.5 billion by 1986, which means more acquisitions since organic growth will only generate \$400 million. This leaves revenues equivalent to GE's current (1982) size to be found over the next four years - difficult at best. GEISCO has targeted "the acquisition and resale of information as a commodity," electronic mail (of which GE used to have 48%), factory automation, CAD/CAE, banking, and international finance. Software products, PCs, CAD/CAE systems and robotics are seen as tools to achieve these ends.

CURRENT STRATEGY

The main sales strategy is to develop a broad range of off-the-shelf and customized solutions that match all facets of the target users' needs. To do that GE has purchased software companies that possess what it believes is part of its needs (general ledger and accounting, data base management system, automated engineering, energy monitoring, etc.). GEISCO will offer the use of such software off of the network but will also have a software marketing firm sell it as software products (EXECUWARE).

GEISCO will concentrate its efforts on the markets that have provided it with its growth (and with which it feels most at home): manufacturing and related applications, finance/banking, and general purpose timesharing. It recently purchased \$10 million of IBM PCs to accelerate the availability (and configuration) of the product to its customers.

GEISCO's debt/equity ratio is lost in FEs overall financial statement, but the company will continue to concentrate its acquisition efforts on software and micro-computer turnkey companies.

CAPABILITIES

GEISCO provides interactive and remote batch processing, professional services, applications software products, and turnkey systems to approximately 6,000 clients worldwide, primarily in banking, finance, manufacturing, and energy markets. Services include industry-specific applications and general accounting/administration, decision support, and management reporting. The total library of applications numbers approximately 2,000.

Three supercenters process the data fed to and from the network, in Rockville (MD), Springfield (OH), and Amsterdam (The Netherlands). A total of 450 processors of data and communications are used, including 48 Honeywell DPS 8/70 systems and three IBM 3081s, under MVS, providing a separate service.

The main service is the MARK III interactive and remote batch service (successor to the original MARK I service introduced in 1965), supplemented by an increasingly large professional services group, software products subsidiaries, and turnkey systems. Manufacturing represents 35% of GEISCO's business, the largest share.

Sixty percent of revenues are generated in North America, 30% in Europe and the Middle East, and 10% in the Far East. Europe has become the slowest growth area.

Applications available on the MARK 3000 Service and MARK III Service are shown in Exhibits B and C respectively.

GEISCO's company and product images are excellent and in the same league as IBM's thanks to the parent company's strength, the worldwide network and GEISCO's position as the number one remote computing services company.

MANAGEMENT

Effective October 21, 1983 GEISCO reorganized "to make GEISCO more flexible, responsive and entrepreneurial." This essentially meant moving away from industry marketing (banking, insurance, etc.) towards a geographically responsible sales organization: areas, regions, districts, and branches. Some large targets have their own sales organizations: CPAs, telephone companies, financial institutions, and national accounts. A single software company (Software Services Company) bundles its software acquisitions, and another (General Electric Professional Services Company) the contract services. An organization chart is attached in Exhibit A.

ASSUMPTIONS OF FIRM

GEISCO believes it can become a sole source supplier of interactive computing services by rapidly broadening its software application capability. It does not appear to have targeted the private corporation network accurately. GEISCO is the largest worldwide remote computing services company thanks to its strength in non-U.S. markets, where it also dominates. It did not seem to have had difficulty growing until 1982 when targets were not met.

GEISCO's principal competition comes from CDC, Boeing Computer Services, Tymshare, and COMSHARE, but it sees itself ultimately competing with AT&T and IBM.

GENERAL CHARACTERISTICS

GE's sales policy is to handle mainstream business through direct sales, and ancillary opportunities through marketing agreements with third parties.

Acquisitions, aimed at filling out GE's applicational coverage, have included: Lambda Technology (professional services in banking, finance, and manufacturing), Software International (accounting, financial application software), Network Consultants (software and professional services in banking and finance).

Divestitures have included Genigraphics (computer generated slides) and Enercom (utility industry software).

GEISCO's principal key to success has been its size, its captive revenue (\$95 million in 1982 from GE companies worldwide) and its strong cash flow. It appears that GE's concentration on factory automation will do for CALMA and GEISCO what McDonnell Douglas has done for MCAUTO: carry them through the formative years of factory automation at a profit.

EXHIBIT A

GEISCO ORGANIZATIONAL CHART

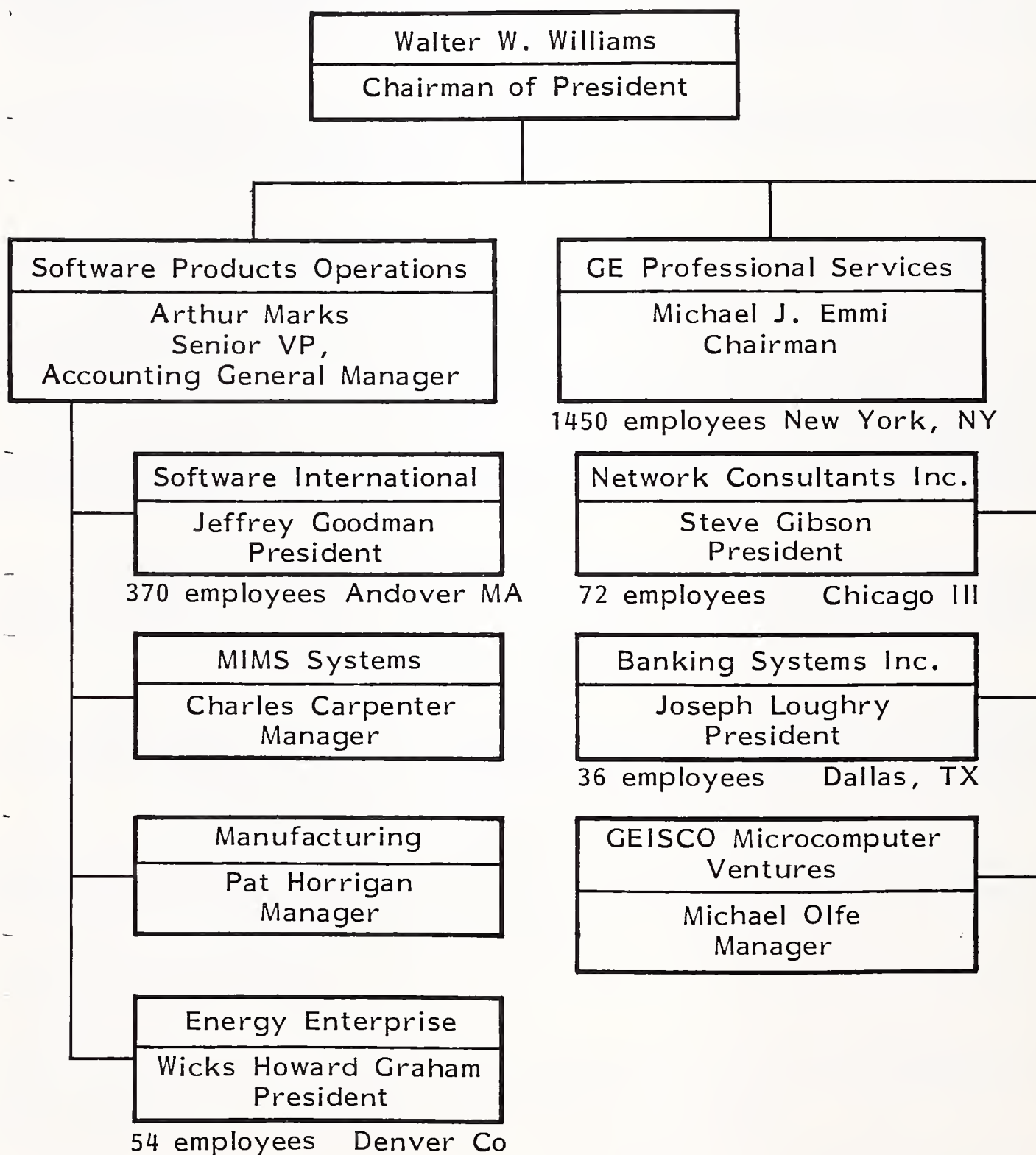


EXHIBIT B

APPLICATIONS AVAILABLE ON MARK 3000 SERVICE

APPLICATION AREA/PRODUCT NAME	APPLICATION AREA/PRODUCT NAME
<ul style="list-style-type: none"> ● OPERATING ENVIRONMENT <ul style="list-style-type: none"> — IBM 3081, MVS, TSO, CICS ● PROGRAMMING LANGUAGES SUPPORTED <ul style="list-style-type: none"> — FORTRAN 77 — COBOL — PL/1 — BASIC ● DATA MANAGEMENT SOFTWARE <ul style="list-style-type: none"> — MARK IV — IMS — SYSTEM 2000 — LIBRARIAN — MIMS SYSTEM — FOCUS ● DATA BASES AVAILABLE <ul style="list-style-type: none"> — PETROLEUM DATA BASE ● FINANCIAL APPLICATIONS/TOOLS <ul style="list-style-type: none"> — GENERAL ACCOUNTING — FINANCIAL PLANNING (FCP-EPS) — FORECASTING (SIMPLAN) — BUDGETING AND MODELING (CPL/TACTIX) ● SCIENTIFIC AND ENGINEERING <ul style="list-style-type: none"> — MECHANICAL ENGINEERING AND DESIGN <ul style="list-style-type: none"> • NASTRAN • SUPERB • ANSYS — CIRCUIT ANALYSIS <ul style="list-style-type: none"> • ASTAP ● GRAPHICS <ul style="list-style-type: none"> — TELL-A-GRAF — SAS/GRAPH — SYMAP — CALFORM — ASPEX 	<ul style="list-style-type: none"> ● RESOURCE MANAGEMENT <ul style="list-style-type: none"> — MARK IV EEO — PROJECT MANAGEMENT <ul style="list-style-type: none"> • PC-70 • PROJECT/2 ● ENERGY <ul style="list-style-type: none"> — APEC PROGRAMS — DRILLING ACTIVITY ANALYSIS — EXPLORATORY WELL FILE — EQUIPMENT SELECTION — TRACE (TRANE AIR CONDITIONING ECONOMICS) ● ORDER SERVICE <ul style="list-style-type: none"> — DISPATCH 3000 ● MANUFACTURING <ul style="list-style-type: none"> — MIMS MFG — PLASTICS ENGINEERING ● DISTRIBUTION <ul style="list-style-type: none"> — VEHICLE ROUTING — VSPX (VEHICLE SCHEDULING) ● MATHEMATICS <ul style="list-style-type: none"> — MPS III — MPSX/370 — SPSS ● PLANNING AND MODELING <ul style="list-style-type: none"> — BMDP (PRODUCTION SCHEDULING) — CSMP III (SIMULATION) — DYNAMO III/F (SIMULATION) — GPSS V (SIMULATION) — KETNET — MAGEN (MATRIX GENERATOR)

EXHIBIT C

APPLICATIONS AVAILABLE ON MARK III SERVICE

APPLICATION AREA/PRODUCT NAME
<ul style="list-style-type: none"> • OPERATING ENVIRONMENT <ul style="list-style-type: none"> — HONEYWELL DPS-8/70s, MARK III, GCOS • PROGRAMMING LANGUAGES SUPPORTED <ul style="list-style-type: none"> — FORTRAN 77 — PL/1 — COBOL — BASIC • DATA MANAGEMENT SOFTWARE <ul style="list-style-type: none"> — DMS III — FLEXIMIS — HISAM — SAS — DM IV — REQUEST — SYSTEM 2000 — SITE II — MARK IV — EPICS — DCM — MARDATA • DATA BASES AVAILABLE <ul style="list-style-type: none"> — MAP (ECONOMETRIC DATA BASE) — CURRENCY DATA BASE SERVICE — SECURITIES DATA BASE SERVICE — VALUELINE — NEMA (NATIONAL ELECTRICAL MANUFACTURERS) — DEPARTMENT OF COMMERCE (SIC) — FEDERAL TRADE COMMISSION — CITIBASE — PETROLEUM INSTITUTE — DWIGHT'S ENERGYDATA — CORPORATE FINANCIAL DATA SERVICE — BUSINESS AND FINANCIAL DATA BANK — BI/DATA — COMMODITY FUTURES — AHAM (HOME APPLIANCE MANUFACTURING) — UCLA BUSINESS FORECASTING • FINANCIAL APPLICATIONS/TOOLS <ul style="list-style-type: none"> — GENERAL BUSINESS ACCOUNTING — FINANCIAL ANALYSIS — FORECASTING — AUDITING • BANKING/CASH MANAGEMENT • CHEMICAL • COMMUNICATIONS <ul style="list-style-type: none"> — TELEPHONE COMPANY OPERATIONS AND FINANCE • CONSTRUCTION • DISTRIBUTION MANAGEMENT • ELECTRIC AND GAS UTILITIES <ul style="list-style-type: none"> — ENERGY MANAGEMENT — ENERGY BROKER — UTILITY MODELING • ELECTRONIC MAIL • ENGINEERING <ul style="list-style-type: none"> — CIVIL — MECHANICAL — ELECTRICAL AND ELECTRONIC • HUMAN RESOURCE MANAGEMENT

APPLICATION AREA/PRODUCT NAME
<ul style="list-style-type: none"> • INSURANCE • INVESTMENT RESOURCE MANAGEMENT • INVENTORY CONTROL/ORDER SERVICE • GRAPHICS AND PLOTTING • LINEAR PROGRAMMING • MANUFACTURING <ul style="list-style-type: none"> — INDUSTRIAL ENGINEERING — PLASTICS ENGINEERING — MANUFACTURING MANAGEMENT — NUMERICAL CONTROL — PRODUCTION SCHEDULING — QUALITY CONTROL • MARKETING AND SALES • MATHEMATICS • MEDICAL AND HEALTH CARE • MINING • OPERATIONS RESEARCH AND MODELING • PETROLEUM/ENERGY • PROJECT PLANNING AND MANAGEMENT • REAL ESTATE • SIMULATION AND MODELING • STATISTICAL ANALYSIS AND FORECASTING • TRANSPORTATION <ul style="list-style-type: none"> — MARINE MANAGEMENT • MISCELLANEOUS

COMPANY PROFILE

IBM INFORMATION NETWORK

51 Weaver Street
Greenwich, CN 06830

Telephone: (203) 629-2023

General Manager: James M. Hewitt

Status: Division of IBM

Year Founded: February 1982

Fiscal Year End: December 31

PERFORMANCE

In the first year of operation, interactive processing and remote batch services generated approximately \$28 million. Prior to January 1979 IBM had been constrained not to offer data services under an-agreement of a private anti-trust settlement with Control Data Corporation

BUSINESS MIX

In its first year, the business mix was primarily from banks, telephone companies, engineering and contract firms, aerospace companies and law firms. In 1983 this mix will be substantially altered by the addition of the Insurance Communications Service (linking 50,000 independent insurance agents and underwriters with insurance companies nationwide) and by the Network Service which will provide design, testing and management of client private communication networks.

GOALS & OBJECTIVES

The goal is to facilitate the sale and support the installation of IBM computer products, as well as provide classical timesharing, remote batch and data network services. The objective is to provide a competitive alternative to other suppliers who want to keep the clients, once captured, on their network. IBM/IN has no such ambition; rather their clients will be encouraged to upgrade to in-house solutions as soon as their processing volume permits. The private network offering aims at avoiding making IBM clients dependent on a third-party for data transfer between IBM equipment.

CURRENT STRATEGY

The strategy of the IBM/IN group is to provide all of those services and capabilities that are needed to capture new clients, hand hold them while they are awaiting delivery of their IBM computers, assist in the acceleration of the acceptance of those computers and help avoid letting IBM customers go outside for consulting, programming or network design skills (that might lead to a non-IBM solution for the clients application). In one year much has been accomplished. Look for more, similar tools and for the expansion of more truly information service offerings in the next five years.

There are no financial details available on IBM/IN but INPUT believes the group is currently losing money.

CAPABILITIES

The Network Service interfaces terminals with remote host processors, or one host with others, within the same corporation or outside of it. The key aspect of the system, however, is the professional guidance and assistance that is available in planning, designing, implementing and managing the network requirements of clients (which are likely to become very complex quickly over the next five years due to data/text/voice and graphics integration and the linking of LANs with remote networks).

The Data Bank is an on-line data bank that is a catalogue of all current IBM hardware, software, training and documentation products (and prices).

The Development Center is a test bed for the preparation of application systems and data bases for installation on IBM systems that have yet to be delivered. It essentially accelerates acceptance schedules and therefore accelerates revenue recognition.

The Information Center is the only true timesharing-like service but it is aimed at helping professional people, with no (or little) data processing experience, to use computers in their work. It is essentially a greenhouse for the development of seedling IBM clients.

A list of the products and applications available is shown in Exhibits A and B.

The company image is, of course, first class, but the product image is not established yet. It isn't clear yet what IBM intends the primary role of IBM/IN to be.

MANAGEMENT

The management structure of IBM/IN is not available, nor is the organizational chart.

ASSUMPTIONS OF FIRM

Other computer manufacturers either offer makeshift services (based on in-house demonstration machines) or compete with the in-house system (e.g., CDC Data Services). IBM/IN is intended to offer a professional solution to the pre-installation prospect or client, and take care of his temporary remote computing needs and/or his network needs. IBM believes its approach is unique. It has a market potential of \$500 million over the next three years. Competitors will be unable to compete because IBM will have control of the in-house system as well as the network, in addition to the traditional remote computing capabilities.

GENERAL CHARACTERISTICS

IBM/IN is sold in 11 cities (Atlanta, Boston, Chicago, Dallas, Houston, Los Angeles, New York, Philadelphia, San Francisco, Tampa, and Washington, D.C.). It is available seven days a week, 24 hours a day.

There is no plan for acquisitions. IBM will apparently grow all of its business organically (which will require substantial funding due to the huge potential).

The IBM/IN operations are currently one-tenth of one percent of IBM's total revenue. By 1987 it is expected to be half of one percent or approximately \$400 million (a 70% compounded annual growth rate).

The uniqueness of IBM/IN is simply the IBM name which has an incredible marketing value. There are no unique skills or products.

INFORMATION NETWORK

APR 11 1982

IBM Information Network

The IBM Information Network began operations in February, 1982, with the introduction of a new computing network offering coast-to-coast data networking for remote information processing.

The IBM Information Network's remote computing offerings are designed to boost data processing productivity and make a variety of problem-solving applications available to end users. The network links users to an IBM computing center in Tampa, Florida, where advanced operating system programming and more than 100 productivity, development and application programs are available for use by data processing professionals as well as non-technical end users.

The remote computing resources enable data processing professionals to develop, test and maintain application programs. They also can be used to get a "head start" on installing or converting programs to run on new in-house computer systems.

The IBM Information Network also can assist end users with minimal data processing experience to access applications and quickly become familiar with their use. Finance officers or business planners, for example, can use the IBM Information Network for problem-solving or for diverse applications such as editing of reports and other documents, testing the effect of inventory levels on sales, or analyzing sales by individual stores in a chain. Users can create customized letters and reports or develop and display color charts and graphs.

Network Services

In September, 1982, the IBM Information Network added a new offering, the Network Services product, which enables customers to use the network to interconnect their own terminals and host processors. This makes it possible, for example, for a user in New York to access applications running on a computer system located in Dallas or Chicago. It would also enable the user to access the IBM Information Network's remote computing resources in Tampa.

This networking offering also provides IBM assistance in planning, installing and managing data communications lines and equipment, making it easier to establish and use networks.

Remote Computing Offerings

Remote computing resources available from the IBM Information Network's Tampa center are grouped into three general categories: Information Center, Development Center and Data Bank.

INFORMATION CENTER: Applications available in the "Information Center" give business, government or education professionals access to data processing tools to assist with problem solving, text editing, project management, financial planning and analysis. These resources are designed for use by professionals with little or no data processing experience.

For problem solving, users can, for example, enter information on interest rates, manipulate the data and ask "what if" questions to better understand the effect of variables on plans. With project management capabilities, users can track schedules, costs and progress. Text processing applications can help create, customize, edit, store and retrieve documents, letters and reports.

DEVELOPMENT CENTER: The computing resources available under the "Development Center" are designed primarily for use by data processing professionals who are developing, testing or maintaining programs or preparing software for installation on new in-house systems. The tools available to DP professionals include: Virtual Machine/System Product (VM/SP), Disk Operating System/Virtual Storage Extended (DOS/VSE) with Advanced Function, Multiple Virtual Storage/System Extension (MVS/SE), and Customer Information Control System, Virtual System (CICS/VS).

In addition, the Development Center makes a variety of compilers, programming languages, conversion aids and utility programs available to assist system and application programmers and other data processing professionals.

DATA BANK: The IBM Information Network Data Bank offers Information/System II which is also primarily used by data processing professionals. It is an online system that provides current information on many IBM hardware and software products, publications and education offerings.

The IBM Information Network is marketed in eleven cities: Atlanta, Boston, Chicago, Dallas, Houston, Los Angeles, New York, Philadelphia, San Francisco, Tampa and Washington, D.C. It is generally available 24 hours a day, seven days a week. A toll-free Customer Assistance facility operates six days a week to provide operational assistance.

Network Services

APR 11 1985

Networking: The Data Communications Dilemma

A data communications network is something many businesses can't afford to do without, yet can't afford to do themselves.

A well-planned and implemented data communications network increases operational productivity and efficiency... and extends computer power to virtually any location that has a communicating terminal. Designing, implementing, and operating a data communications network is a complex, time-consuming process; the task can stretch available DP resources to the limit and impact ongoing operations.

Network Services: The IBM Information Network Solution

Network Services, a unique product of the IBM Information Network, can reduce the cost, complexity, and time required to implement a data communications network. It can provide faster start-up at lower cost than internal development and implementation, while offering a proven, low-risk entry into data communications networking.

Network Services is designed to simplify the complexities customers face in the installation, operation, and management of data communications networks. **Network Services** provides customers all the services and facilities needed to effectively implement a data network. These fall into three main areas:

1. Installation Support
2. Operational and Management Support
3. Enhanced Network Support Functions

Trained IBM Information Network Systems Engineers work closely with **Network Services** customers to identify and analyze organizational information requirements, and to design effective data communications network solutions. IBM handles the installation coordination, education and implementation planning required for start-up and maintenance.

At the customer's option, the IBM Information Network will manage access lines and modems — allowing "end-to-end" responsibility for network operations in the hands of a single vendor.

IBM's established procedures, documentation, controls and user aids simplify data network management and use. **Network Services** provides network capacity planning, controls physical network resources, and monitors performance and availability.

Once the customer's network is attached to the IBM Information Network, **Network Services** tracks problems, network changes and network inventory, and provides management reports. Customer organizations also benefit from easier maintenance of host systems, flexibility to enhance applications, and the ability to expand the user community through the use of standard software in their host computer.

In addition, customer networks are protected by security facilities, and have continuous access to advanced problem determination and resolution techniques developed by the IBM Information Network.

Customer organizations can also access the IBM Information Network's main computer center in Tampa, Florida. On a "pay-for-what-you-use" basis, customers can access more than 120 IBM productivity program products to evaluate usefulness and cost-justify applications for possible transfer in-house.

How Network Services Work For You

Installation Support

Network Services provides the evaluation, analysis, design, installation planning, coordination, testing, education and training required to install a data communications network that meets customer needs. **Installation Support** consists of the following key phases:

Implementation Planning — IBM Information Network Systems Engineers work closely with customers in planning any host-site changes and remote-site requirements. In cooperation with customer's normally assigned IBM Systems Engineer, IBM Information Network representatives assist in preparing a detailed implementation plan (including necessary software upgrades and migration, host-site hardware upgrades, physical planning and site preparation plans for terminal locations). The plan also encompasses education and training so users can get started quickly.

Installation Coordination — IBM Information Network systems engineers coordinate the overall installation effort to provide compatibility between scheduled dates for equipment and line installation. Working with a Service Administrator designated by the customer, site preparation at terminal and host locations is closely coordinated to facilitate smooth installation.

Installation and Testing — Customer host processors are attached to the IBM Information Network with either a Systems Network Architecture (SNA) or IBM Information Network Binary Synchronous Communications (BSC) emulation interface. IBM 3270 terminals Synchronous Data Link Control (SDLC) or BSC are supported for interactive communications with either host interface type. **Network Services** requires only standard IBM software in host computers.

IBM Information Network verifies installation of communications facilities (lines and modems) through basic link tests. Installation of access lines, modems and terminals at customer sites is the customer's responsibility, but **Network Services** provides detailed installation plans. Installation is certified complete when terminal users can access applications in customer host computers.

Extended Network Attachment — If a customer chooses this option, IBM Information Network not only coordinates installation of access lines and modems, but will order and manage them as well.

Education and Training — Education for the customer's Service Administrator is available from the IBM Information Network Education Center in Tampa. Service Administrators gain hands-on training in use of administrative functions of the IBM Information Network. Also provided are sample materials for training remote-site personnel. IBM Information Network Systems Engineers can assist in customizing sample materials to meet each customer's individual network requirements.

Operational and Management Support

Once certified, IBM Information Network assumes responsibility for network operations and management, freeing customer DP personnel to meet central site and end-user requirements. Operational and Management Support provides these services:

Network Operation — IBM Information Network operates the network with availability and performance in mind. Customers are responsible only for operating host-site hardware/software and remote-site terminals/control units.

End-to-End Facilities — Using the **Extended Network Attachment** option, IBM Information Network provides end-to-end communications facilities management. Customers simply attach terminals and hosts to IBM Information Network-provided modems.

Change Control — A range of support services is provided to assist customers with network-related change management. Services include: recommendations on impact of IBM-distributed changes to Virtual Telecommunications Access Method (VTAM), Virtual Telecommunications Access Method Extended (VTAME), and Network Control Program (NCP) software; assistance in submitting change requests to IBM Information Network, technical assessment of changes submitted by customers; re-certifying new configurations when required; and tracking changes.

Problem Management — From the moment a problem is reported (either on-line or by phone to the IBM Information Network Customer Assistance facility), **Network Services** manages it until resolved. On-line access to problem-management information and report distribution is available through the IBM Information Network Customer Support System (CSS).

Problem Determination — Problem determination is a high priority function of **Network Services**. For all users, the initial point of contact is IBM Information Network. Specially trained operations personnel perform initial problem determination; if a problem is not resolved, it's assigned to second-level support functions. If a problem is determined to originate with the customer, it's referred to the Service Administrator. IBM Information Network will provide reasonable assistance on customer-designated problems referred to the Service Administrator.

Service Administrator Support — Customers have access to additional enhanced support functions to help Service Administrators make the best possible use of their data communications networks. These include:

- **Password Maintenance** — This offers Service Administrators the option of handling password maintenance on behalf of users within the same account.
- **Application Access Control** — Service Administrators control access to applications in their host computers, by user-ID or account-ID.
- **Customer Assistance** — Service Administrators may call Customer Assistance at any time with questions related to problem management, change control, or equipment inventory. If an answer is not readily available, an IBM Information Network Operations Representative will provide additional assistance.
- **IBM Information Network Customer Support System (CSS)** — Using Customer Support System (CSS) Service Administrators have the ability to request certain reports for routing to their own terminal printer and to obtain status on problems within their account. CSS also offers access to problem management functions (such as capability to answer and close problems assigned the customer for resolution).
- **Message Broadcast Facility** — This function permits Service Administrators to send messages to one or more users.
- **On-Line News Facility** — Service Administrators also have access to the News facility and permanent storage to notify users of new functions on their host computer, or to provide other information valuable to users.
- **Status Facility** — This facility allows Service Administrators to display current status of terminals or users on command.

Management Reports — The management of any data network hinges on accurate, timely reports. Three management reports are available:

Problem Summary — A weekly problem summary delivered on-line to the Service Administrator's printer.

- **Problem Detail** — A problem detail report, delivered on-line to the Service Administrator's printer, is available upon request.
- **Equipment Inventory** — Whenever changes occur, a list of the customer's network-attached terminal and control equipment is delivered on-line.

IBM Information Network Enhanced Network Support

An extensive range of IBM Information Network products and services is available to **Network Services** customers. These functions aid users, simplify access to the network, and assure data security and control.

User-Friendly Interfaces — Using the network is simplified through user-friendly interfaces. Entering only a user-ID and password, users are prompted with a product selection screen which has a "menu" of all applications they're authorized to access. If confused, users can request additional information or assistance via the HELP facility.

Security — Security and authorization is performed by **Network Services** software. Network access is controlled by user-IDs and passwords. User-IDs must be valid for the specified account ID and the user's profile is checked for authorized applications. Access to applications not in the user's profile is restricted.

Password Maintenance — Users can maintain their own passwords or allow their Service Administrator to maintain them. Passwords are stored in user profiles accessible at any time. This permits users their own schedules for changing passwords within the context of IBM Information Network security procedures.

Hosts

Host computers attached to IBM Information Network for **Network Services** must use Advanced Communication Function (ACF) VTAM, ACF/VTAME, or Basic Telecommunications Access Method (BTAM), and either Information Management System/Virtual System (IMS/VS) or Customer Information Control System/Virtual System (CICS/VS) sub-systems. Other requirements may be handled on a Request Price Quotation (RPQ) basis.

Host Attachment Via SNA/MSNF Interface

The following levels are supported: (ACF)/VTAM with MSNF at Version 1/Release 3 or MVS; ACF/VTAM with MSNF at Version 1/Release 2 or Version 1/Release 3 on DOS/VSE; ACF/VTAME; ACF-NCP Version 1/Release 2 or Version 1/Release 3.

Line Speeds

Terminal or control units attached to the IBM Information Network network via analog lines, are supported at these speeds: for analog lines: 2400, 4800, or 9600 BPS. Both point-to-point and multi-point lines are supported, but multi-point lines are only available with the Extended Network Attachment or on a Request for Price Quotation (RPQ) basis.

Host attachments are supported at 4800 BPS or 9600 BPS on point-to-point lines only.

Let Us Tell You More

If you would like to attend a demonstration or seminar on **Network Services** or would like to have a marketing representative contact you, write:

IBM Information Network
P.O. Box 30104
Tampa, FL 33630-3104
Or, call IBM toll-free: 800-631-5582.

APPLICATION SYSTEM (AS)

Personal computing for professionals

Application System (AS) is an IBM Information Network product which allows business professionals to manipulate and examine data in a straightforward yet extremely flexible manner. It provides comprehensive remote computing capabilities to managers, administrators, clerks, and staff professionals in business, industry and government. AS makes information directly accessible to the person who needs it, both quickly and easily.

AS provides the user with a complete set of application-oriented, data processing capabilities. Facilities include:

- data management including entry, update and verification
- information retrieval and simple analysis
- formal reporting
- business communications
- project control
- special statistical and forecasting analysis
- business planning and modeling
- business graphics

AS provides a simple concept of data, a consistent and simple language for directly describing and manipulating data, a means for managing files efficiently, a procedural language for repetitive tasks, and protection against unauthorized access of data.

The operation of AS is controlled by a wide range of simple commands. Although easy to understand, they are extremely powerful and can be combined in a variety of ways so that a wide range of applications may be built using AS. While working in AS, users may review definitions of stored data, view selected data or intermediate results, specify presentation in tabular or graphical format, obtain assistance to understand messages from the system, and determine the status of their work in progress.

AS has already proven to be a popular Information Center product in Europe and Japan where it has been available for several years through IBM Data Center Services.

Application System, accessed from terminals located at the user's premises, resides in the IBM Information Network computer complex in Tampa, Florida. Connection between the terminals and the host computers is made using either switched or leased lines to a network access point in one of ten major cities.

Highlights

- File definition facilities of AS include the ability to define record types and sequences, field names and types, size and precision specifications, and other access capabilities.
- The data creation capability allows the user to specify during data input skip fields, repeat values, and extended values based on linear or percent trends as well as to list, find, move, change, copy, replace and

delete records and fields. Optionally extended validation of input data against field definitions and limits is permitted.

- A standard screen format provides for easy viewing, amending and entering data. Users have the facilities to design panels for themselves by mapping out screens with text and data area location specified, as well as data characteristics, including color and display protection.
- File control facilities of AS allow the user to specify input and output files or accept defaults such that the last output file is used for next input, and optionally to keep or delete files when finished processing. Access to multiple, concurrent files in series or in parallel is possible. Processing of related files can be specified based on match criteria for user selected key fields.
- Data control includes the flexibility to select records and fields based on arithmetic or logical operations and comparisons to reduce the working input file and to resequence if necessary.
- Users have the option of creating simple reports that use standard formats or of specifying complex report formats. Specified reports may have various levels of calculated data, statistical evaluations and modeling formats, comments or headings, totals by row or columns on specific control breaks, detailed or summary information, or graphical formats. Simple viewing of selected data from a file in an unformatted presentation is also possible.
- Modeling functions of AS provide the ability to specify relationships between the items in a plan, define various known or projected values for items, and to manipulate required values to investigate "what-if" situations. AS calculates values for all items in the plan based on their interrelationships and/or initial values. The business plan may be spread over various time periods — months, quarters, years — with subtotals at any desired frequency. A variety of reports can be generated from a raw financial output file by means of differing selection criteria or report specifications. Standard reports are available for various time period plans. These may be used directly or altered as desired.
- Statistical functions built into AS include:
 - elementary statistics such as mean, standard deviation, error and range.
 - simple, partial, and cross correlations
 - regression analysis
 - linear, multiple, polynomial, stepwise and two stage least square
 - linear trends and curve fitting
 - time series forecasting techniques such as adaptive filtering, Box-Jenkins, Shiskin X-11, and others
 - parametric and nonparametric tests including F test, Chi square, Cochran Q test, and Kendall Coefficient of Concordance.

- general analysis procedures such as analysis of variance, canonical correlation, and cluster, discriminant and factor analysis
- Standard plot, graphs, and histograms provide a pictorial view of data. Procedures also exist for specifying histograms and line plots with complete user control over scales, titles and labels, as well as color and plotting characteristics. Automatic generation of points can produce connecting lines.
- AS project tracking facilities can process both arrow and precedence networks. After jobs are identified with start and finish dates, duration, relationships and time delays, progress can be reported on in four different ways. Standard barchart specifications can graphically depict dependencies and a variety of standard formats can produce calendar reports.
- The creation of formatted documents is aided by a simple yet highly flexible text processor. Features include line length adjustment, justification, multi-column output, automatic table-of-contents, control over spacing, indentation, paging, title specification at page top or bottom, and section headings. Data that has been included from other facilities, such as a summary report or a graph, may even be highlighted with color.
- A meeting command provides the ability to use a terminal in place of a blackboard or projection screen for visual contact during a meeting. All the presenter's output, and as an option the input commands also, is duplicated on the screens of selected observers who are also logged onto the AS system.
- File sharing and data security in AS is provided by the library structure. Project libraries allow users within a contract to share data, while private libraries provide a repository for data belonging exclusively to one user. An individual data set in the project library can be further protected by password. Only the data set owner can delete a file from any library.
- Printing of data files and screen images is accomplished with two simple commands.
- Online information screens supply descriptive information on using the system and show examples of common functions. Online user assistance also includes error explanation, query of status and files, conversational forms of REPORT, STATISTICS and NETWORK, predefined data screen panels and financial report formats, menu screens to assist in getting files into and out of AS; and INFO and NEWS for distributing information to users.
- A system log maintains a record of each user's activity and, if the system terminates abnormally, provides for recovery of the last session's activity and data.

Restrictions: The AS LP command and linear programming processor are not available to users of AS on the IBM Information Network.

Service hours: AS is available via the IBM Information Network from 6:00 am to midnight Eastern time, seven days a week, except for scheduled maintenance.

Customer assistance: AS technical assistance will be available from Customer Assistance personnel on Monday-Friday, 8:00 am to 8:00 pm Eastern Time, and on Saturday, 8:00 am to 5:00 pm Eastern Time.

An online facility can be used to report problems or request help, or users can call the toll-free telephone number provided for Customer Assistance. The online facility allows users to enter problems or questions directly to Customer Assistance. There is no charge for the use of the online facility.

Availability of inhouse option: In addition to offering Application System as a remote computing service, IBM intends to license a version of the Application System for internal use in customers' own systems. This new offering will be designed to run on an IBM 4300 processor under VM/SP Release 2. Planned availability is prior to the end of 1983. New terms and conditions provide for an initial charge and monthly charges related to the number of concurrent end users.

Charges: See the separately available IBM Information Network schedule of charges.

Education: The IBM Information Network education center personnel will be conducting AS usage classes based on sufficient demand and at locations best suited to the needs of IBM Information Network customers.

These classes consist of:

- AS Concepts and Facilities 1/2 day
- AS for New Users 2 and 1/2 days
- AS Getting Started Workshop up to six half days

A description of these classes and a location schedule is available.

The IBM Information Network Market Support Center is also prepared to offer large account briefings and planning sessions and customer executive briefings and fly-ins as requested.

Let us tell you more

If you would like to attend a demonstration or seminar on the IBM Application System or would like to have a marketing representative contact you, write:

IBM Information Network
P.O. Box 30104
Tampa, FL 33630-3104

Or, call IBM toll-free: 800-631-5582.

APR 11 1985

PRPQ PO9033

Resources for personal computing

IBM PROFESSIONAL OFFICE SYSTEM (PROFS)

The productivity vehicle for managers, professionals and administrative support staffs

Spurred by the increasing complexity of doing business, the annual outlay for direct office expense is mounting at an alarming rate. And professional office staffs account for 75 percent of that figure.

Given the methods of business as usual, there seems to be no end to this costly spiral. But consideration of the computing potential you already have in place can lead to an exciting breakthrough in the search for ways to increase professional productivity.

Revolutionize the working day

What would it mean to the professional to effectively reorder the creative, communicative and scheduling aspects of the entire working day? What would it mean to:

- Get detailed information from others in minutes, even over vast distances?
- Send electronic messages in return?
- Have ready access to the latest information available?
- Manage time efficiently through automatic calendar, reminder or "tickler" files?

All this and more is available with the IBM Professional Office System (PROFS), a Licensed Program, that, in customer and IBM locations alike, has proven its productivity potential in four vital areas:

- Reducing elapsed time to complete tasks
- Increasing the quantity of work produced
- Improving the quality of completed work
- Speeding business communications

Easy steps to PROFS productivity

To appreciate the extent to which PROFS can compress time and task completion, consider the impact the system would have on a professional's working day.

From a display terminal, the principal or secretary can:

- Send and receive electronic mail
- Search for and retrieve documents
- Update and check calendars
- Schedule meetings and physical facilities
- Enter, edit, proofread and file documents

Thus, this "one person, one terminal" arrangement permits the professional to create, communicate and distribute — all by pressing a few keys. And all these can be performed largely free of paper clutter, repetition of information-handling steps, and dependence on the hit-or-miss of regular telephone calls and delays of conventional mail deliveries.

To better understand how easy it is to use PROFS, let's look at the sequence of events involved in a typical PROFS operation.

The sign-on

From an IBM display terminal attached to PROFS, the user gets into the system by supplying a personal identifier and password known only to the user and the system administrator. Passwords are not displayed when they are entered, and they can be easily changed periodically. Once cleared, the user can access PROFS, communicate with other PROFS users or distribute information in many forms to any number of terminals near or far.

The main menu

PROFS displays menus to guide users through its functions. The main menu lists the primary functions and keys designated to invoke each of them. The system also allows for customizing two additional main menus to provide only the functions you want, in the order that you want them. The user can even add other business applications to the list.

The lower part of each main menu screen is reserved for messages. For example, the user might want to preset reminders for meetings. The reminders can be displayed on the desired date and even accompanied by an audible tone. Or you might include a schedule of follow-up messages to assure that actions requested are actually put into effect.

And any time more information is needed to explain a specific function, a "help" facility can be called up to clarify procedures.

The calendar

Maintaining personal calendars, setting up meetings, and scheduling conference rooms and equipment are time-consuming office activities. These tasks are simplified when you use PROFS.

Appointments can be displayed chronologically for a single day or summarized for an entire month. As entries are added or cancelled, the system automatically resequences the order.

You may selectively permit others to review or alter your calendar. And you can limit access to specific appointments that you designate as "confidential."

You can also use the calendar function to schedule the use of conference rooms and other physical facilities.

The electronic in-basket

After checking your calendar, you would probably want to "open" your incoming electronic mail. Like a hidden in-basket, PROFS holds mail and other documents until you read, file, forward or discard them. Incoming mail is listed in the order of its arrival by author, addressee and subject. If you prefer, you can have a document printed out or forwarded to others, with an electronic routing slip attached, for information, follow-through or other action.

Your electronic note, incidentally, is a sure way to avoid "telephone roulette," and your personal message goes directly to the addressee's terminal, exactly as you worded it. Any reply can also be by electronic note. For future reference, notes can be retained in a permanent log.

The file search

To find a document in PROFS, the user can initiate a document search in a number of ways: by date, author, addressee, subject, comments, keywords, due date, status, or action required. The search can be as broad as requesting all documents by a given author in the past 90 days, or as specific as uncovering a single document, author unknown, by using one or more keywords. Even documents kept in file drawers and other locations can be indexed by PROFS.

Naturally, relevant documents that are found can be read, reviewed, printed or forwarded to another PROFS user. The point is that PROFS provides you, the professional, with fast, ready access to any documents you have sent, received or otherwise filed in PROFS for more timely, accurate communications — and, potentially, better decisions.

The preparation of memos

Once a principal or secretary specifies the type of memo to be generated, the system automatically prompts the user to insert heading information, such as author, subject and date. This information also serves to create an index record for PROFS filing. Prestored author profiles and formats provide standard information to reduce keying time.

Once the text is keyed, the document can be viewed in final form or revised as necessary. Drafts can be forwarded to others for their review or changes.

Of course, at any time during the creation process, the document can be proofread by PROFS.

Proofreading

Proofreading the finished document is simplified, too, because PROFS provides a spelling checker based on a 134,000-word English dictionary, plus medical and legal dictionaries. And users can add an unlimited number of their own words as well.

Electronic distribution

Once your finished document is ready for distribution, it may be sent to one addressee — or hundreds.

If people are on the same PROFS system, when the document or memo reaches its destination, a receipt notice goes back to the sender. The document, meanwhile, is placed in the electronic in-basket of the recipient where it remains until the mail is opened. The recipient can read the document or memo and file it, forward it, print it out, hold it for follow-up or simply discard it.

Once document preparation and distribution are completed, you can return to the main menu to display reminders and message throughout the day, or to use other PROFS functions.

Electronic distribution and receipt speed communications to shorten decision times and improve productivity.

Getting started

The IBM Professional Office System is an exciting, innovative way to help improve the productivity and effectiveness of managers, professionals and administrative support people. This is particularly true in organizations with multiple locations that have a computing capability to support them.

It is also a far-reaching system that can improve the way things "have always been done." That's why it's important to initiate PROFS in a single key area, followed by gradual extension to other departments or divisions as your experience with the system and confidence in it grow.

This phased implementation, for example, will give you the opportunity to adapt PROFS to your operating style, to make unique system extensions you desire, and to make crucial cost-versus-benefit assessments.

And PROFS comes with extensive publications which outline simple step-by-step procedures for all users. These publications are designed to help managers, professionals, secretaries and other administrative support personnel start improving their productivity and effectiveness as soon as the system is installed.

Let us tell you more

If you would like to attend a demonstration or seminar on the IBM Professional Office System or would like to have a marketing representative contact you, write:

IBM Information Network

P.O. Box 30104

Tampa, FL 33630-3104

Or, call IBM toll-free: 800-631-5582.

Development Center

Product Description

Productivity For The DP Professional

Achieving increased productivity is recognized as a major challenge facing the data processing industry in the 1980's. The IBM Information Network Development Center offers an effective, comprehensive approach toward enhancing the productivity of DP professionals involved in the program development process.

Development aids incorporated by the IBM Information Network allow programmers using visual displays on their own premises to perform on-line editing, compilation and testing.

Development Center capabilities are offered on both the Conversational Monitor System (VM/CMS) and the Timesharing Option (MVS/TSO), permitting DP users to select the environment with which they are most familiar. These systems are called the VM Productivity System (VMPS) and MVS Productivity System (MVSPS) respectively. They provide powerful yet flexible program development methods, as well as a host of aids for converting programs.

IBM Information Network facilities have been implemented to support the interactive environment such that dialogs permit users to easily select programs. IBM Information Network offerings are based on generally available IBM programs, providing users the additional flexibility to run programs on in-house IBM systems.

Development Center facilities are accessible through full-screen display terminals, remote job entry stations and printers over switched or leased public telephone lines to IBM Information Network nodes in several major U.S. cities.

Development Center users receive field support from trained IBM marketing representatives and systems engineers. Users also have toll-free access to IBM Information Network's Customer Assistance facilities for prompt answers to most usage questions.

Additionally, VMPS provides the Interactive Instructional Presentation System (IIPS) for computer-based training in several areas, including: TSO, CMS, Data Language/1 (DL/1), 3270 Operator Training, Document Composition Facility (DCF), Information Management System (IMS), and others.

CICS Program Development

IBM Information Network CICS Program Development facilities incorporate a series of menus which assist in the selection of functions necessary for the development and testing of CICS/DOS/VS transactions. A series of user panels presents lists of options for selection of routes through the development cycle, and eliminates the requirement for programmers to code control language in accomplishing standard program development tasks. CICS Program Development is a highly productive system that allows users to develop and test CICS programs interactively from a single terminal, thus reducing the impact of testing on in-house IBM systems.

Pre-written functions within the CICS development system are available to assist in the development of:

- **CICS/VS and DL/1 on-line tables:**
- **CICS/VS Maps**, either through Basic Mapping Support (BMS) or the use of Screen Definition Facility (SDF) for on-line map creation;
- **CICS/VS Programs**, using either Command or Macro level interface.

Programming functions such as compilation can be performed either interactively or via the VMPS DOS background machine. There are facilities to assist in the retrieval of output when the DOS background machine is used.

CICS Program Development Testing Facilities

IBM Information Network provides support facilities for use in creation of VSAM datasets for testing. The CICS Program Development transaction testing capability provides each user with a self contained CICS/VS environment. This important feature enables users to test transactions without dependence upon system programmer availability for updating tables, or operating constraints which could displace testing to off-shift or weekend periods.

The testing of transactions is initiated through a VMPS terminal communicating with CICS/VS. A number of standard CICS/VS aids are available to users, including Execution Diagnostic Facility (EDF) and formatted CICS/VS transaction dumps.

Transactions developed under CMS may use VSAM data bases accessed either directly or through DL/1.

CICS Program Development User Benefit Summary

IBM Information Network's CICS Program Development facilities produce a number of benefits. While individual user experiences will vary according to specific operating environments, major benefits which user organizations may derive from IBM Information Network CICS Program Development features include:

Productivity Products The CICS Program Development user has access to a number of products which have been proven to enhance programmer productivity. These include interactive editors, the Screen Definition Facility (SDF/CICS), for interactive screen design, and Development Management System (DMS). Access to these products can be advantageous for users converting to CICS, since application programmers need not wait until the proper support products are installed on new IBM hardware to become productive.

Menus and Dialogs Because CICS Program Development menus and dialogs provide a simplified interface between users and the VM environment, users can become productive with less than optimum skills. The resulting acceleration of application development can be especially valuable to new IBM

customers. While programmers new to the DOS/VSE environment face an educational requirement, the new CICS programmer need not know all the complexities of DOS when using CPD facilities to produce CICS applications.

Enhanced System Responsiveness CICS Program Development facilities contribute significantly to programmer productivity by minimizing delays associated with interactive editor response times and generation of output from compilations or test executions. CICS Program Development users may request that compilations and similar activities execute interactively, thereby obtaining immediate results. Such activities may alternately be routed to a background process while the programmer proceeds with related tasks until the execution completes.

Isolated Test Environment CICS Program Development's isolated test environment contributes to improved programmer productivity and eliminates any possibility that test transactions may cause an entire CICS system to abort. Additionally, CICS Program Development users are freed from dependence on system programmer availability to update new application entries in CICS tables. The CICS Program Development testing facility permits individual CICS Program Development users to maintain and update tables as necessary.

CONVERTING TO IBM?

The Development Center Can Help

The IBM/Information Network Development Center is designed to speed and simplify the conversion from non-IBM to IBM operating systems, and from one IBM system to another.

Development Center facilities assist the systems analyst and programmer in familiarizing themselves with IBM systems and programs in advance of in-house installation, and can provide an environment for developing new applications. The Development Center also permits program managers to assess IBM program development tools before final selection of those which may be used for future in-house development.

Further, Development Center capabilities can help DP management ensure that new IBM systems are fully operational on schedule, permitting DP staff and department users to realize operating benefits as early as possible. Development Center facilities may also help avoid problems sometimes encountered when developing new applications while simultaneously generating a new in-house operating system.

Customers using the Development Center for conversion projects are advised to plan and monitor the overall conversion process with IBM's Project Evaluation and Control System (PEACS) or Project Analysis and Control System (PROJACS). Program documentation may be standardized and simplified using the Document Composition Facility (DCF), which enables programs to be documented via the same terminal used to develop them.

Conversion customers may use terminals on their own premises, connected to the IBM Information Network via lease or switched telephone lines to conveniently access IBM software. Once connected, users have immediate access to a sophisticated set of development and conversion aids, compilers, and utilities.

Base software includes:

- DOS Virtual System Extended (DOS/VSE)
- System Productivity Facility (SPF)
- Customer Information Control System (CICS/DOS/VS)
- Data Language I DOS/VOS (DL/I)
- MVS System Product (MVS/SP)
- Information Management System (IMS.VS)
- COBOL, PL/1, FORTRAN, Assembler, RPG II, VS BASIC, VS APL and Pascal/VS

IBM's base software makes it possible for users to accomplish tasks of program and Job Control conversion and program test. Split-screen editing makes it possible to simultaneously scan compilation errors and correct the source file. Data files can be defined, loaded, printed, and verified using VSAM utilities.

Specific conversion software is available for:

- FORTRAN
- DOS to OS Assembler, COBOL and PL/1
- IBM System/3 DOS/VS RPG II
- IBM COBOL from Honeywell 200 Series
- IBM COBOL from Burroughs 2500 Series
- IBM COBOL from NCR Century
- IBM COBOL from GE-415
- IBM COBOL from RCA COBOL

Information For Action

If you would like to attend a demonstration or seminar on the IBM Information Network's CPD or Conversion resources, write:

IBM Information Network
P.O. Box 30104
Tampa, FL 33630 - 3104

Or, call IBM toll-free: 800-631-5582

INFORMATION NETWORK

The Information Center

APR 11 1985

The Information Center is designed to give professional people the extended decision support tools they need to be more productive in their day-to-day business functions. The system is based on a collection of more than 50 IBM user-friendly software packages that allow users to make analyses and solve problems in their fields of interest. These generally available IBM programs provide facilities for:

- query and analysis
- financial planning
- report formatting
- simple graphics
- statistics
- project management
- text processing
- problem solving languages

With these products, end users frequently can formulate the solutions to their business problems directly, without needing to rely upon their in-house data processing department.

The mission of an Information Center is to provide users with services not normally offered by traditional application development. This includes tools, techniques, and support that will allow users to access their data on their terms to satisfy demand-processing needs. The primary objectives are to build user self-sufficiency in the use of computer resources, to increase user productivity, and to improve the decision-making process by making relevant data more readily available.

In setting up an Information Center, IBM has provided:

- easy-to-use software tools
- education and consulting in the use of these tools
- help in obtaining access to data
- administration support

Now the user needs only to provide:

- knowledge and understanding of the job to be done
- justification for the accomplishment of the task
- resources for the development and maintenance of the application

The following functional areas are supported by the IBM Information Network.

Query and Simple Analysis

An MIT School of Business Management study defined an inquiry system as one that "provides a data base with flexible inquiry capability, enabling managers to design and change their own monitoring and exception reports." When data can be quickly accessed in a form relevant to the user's requirements, it becomes information that can be used in making decisions. The ability to select from the data, count, summarize, average, tabulate, and review selected simple statistics is all-important in making the data useful. The IBM Information network uses the APL Data Interface program and A Departmental Reporting System to provide these facilities.

Formatting of Data

Data presentation is a widespread need ranging from simple lists to formatting highly structured documents. Users need a simple and responsive vehicle for assembling and organizing the data and quickly producing results. The IBM Information Network offers A Departmental Reporting System to provide these facilities.

Simple Graphics

It has been said that "One picture is worth a thousand words." Effective decision-making requires the ability to see through the mass of numbers to appreciate any patterns. Graphs can often highlight various aspects of tabular information — for example, trends of discrepancies — which may not be immediately apparent from the numbers themselves. A Departmental Reporting System offers simple graphics capabilities, including histograms and point plots.

Project Management

Project management and scheduling provide the means to plan and control a variety of products or activities, permitting tasks to be scheduled, resources assigned, costs allocated, interdependencies described, and progress reported. The benefit of a computer system is that it can help reduce the time a manager needs to spend in the clerical activity of checking the progress and dependencies. For project management, IBM Information Network offers the Project Evaluation and Control System, and the Project Analysis and Control System.

Financial Planning

The successful running of a business requires an understanding of the fundamental relationships between various elements. Managing these interrelationships often requires a modeling structure which describes them and allows the user to change assumptions and do "what if" calculations. Strategic decisions often commit an organization for many years, so it is important to make a careful study of a range of possible actions before selecting a strategy. To assist users in this area, IBM Information Network offers the Financial Planning System.

Text Processing

The control and maintenance of text is a common organizational requirement, whether that text includes formal documents, letters, reports, manuals, or simple memos. The Document Composition Facility offers a vehicle for document formatting with features such as spacing, paragraphing, footnoting, spelling verification, and automatic table of contents. For storing and retrieving of finished documents, which in itself can be quite time-consuming, the IBM Information Network offers the Storage and Information Retrieval System.

Detailed Problem Solving

When packages do not meet the needs, a user might learn APL, a powerful and concise problem-oriented language, to modify existing programs or to write new applications. APL provides a wide range of analytical and problem-solving capabilities. For the growing number of business professionals with some programming training, the IBM Information Network offers a variety of other programming tools to allow the creation of specifically tailored applications. These include VS BASIC, Pascal/VS, and FORTRAN versions G1, H Extended, Code-and-Go, and VS FORTRAN, as well as FORTRAN Interactive Debug.

Surrounding many of the products described above IBM has added menus that allow users to easily select a program, and HELP panels describing how to use the dialogs. Many of the packages also contain HELP information to assist the user in learning how to use them.

The packages are installed and run under the IBM Virtual Machine with its Conversational Monitor System (CMS). This gives users the flexibility of also running the packages in an in-house IBM data processing facility.

These products and facilities are accessible through full-screen display terminals such as the IBM 3270, keyboard/printers such as the IBM 3767, and remote printers such as the IBM 3286 over switched or leased telephone lines to IBM network nodes in several US cities or directly to the IBM Information Network computer complex in Tampa, Florida.

IBM professional support is available with the IBM Information Network. The IBM Information Center Specialist in the branch office is familiar with most of these products, and IBM Information Network has trained its own staff of marketing representatives and systems engineers on the products. Toll-free telephone access to Customer Assistance is provided to answer most questions a user may have while using the Information Center facilities.

Let Us Tell You More:

If you would like to attend a demonstration or seminar on Information Center resources, or would like to have a marketing representative contact you, write:

IBM Information Network
P.O. Box 30104
Tampa, FL 33630-3104

Or, call IBM toll-free: 800-631-5582.

DATA BANK FOR DP PROFESSIONALS

Current Information When You Need It

Having the right information when it is needed improves productivity. Our customer surveys and pilot tests show that significant amounts of valuable time and money are spent by data processing staffs, in acquiring, storing and retrieving the technical information they require to plan, manage and operate a computer installation. Users in our pilot tests found that the online data bank gave them the information they needed days sooner. Even if you think you have all the necessary documents in-house, you can't be sure that what you have is current. And searching for the right information in those documents often takes hours of frustrating searches.

This unique service offering provides access to both Information/System II and Information/Library with its Library/MVS data base. Both are easy to use. Each was designed specifically for the kind of documents provided in their respective data base.

The Data Bank is designed to increase the productivity of system and application programmers, systems analysts, data base administrators, operators and librarians working with OS/VS2 (MVS) documentation.

Increased productivity is realized through:

- Easy Information retrieval
- Greatly reduced search time
- Reduction of false starts and program runs due to missing information
- Better performance of OS/VS2 associated tasks
- More frequent and more efficient usage of the OS/VS2 (MVS) documentation.

Ease of use is enhanced through online orientation for the first time or casual user through tutorial and "Help" facilities.

Product Description

The IBM Information Network offers the same data base provided with the Information/System and Information/Library program products, but with several significant pluses:

- The Data Bank is updated and managed by IBM
- Current information is available at your terminal when you need it
- You can use it for as little as \$200/month which provides approximately 20 searches, depending on user needs

A Wealth of Information for Action

Information/Library II provides MVS System Reference Library (SRL) information that reflects the structure of the publications. It consists of titles, tables of contents, indexes, and abstracts and a growing number of documents in full text.

The following publications are included in full text:

- IBM Vocabulary for Data Processing, Telecommunications and Office Systems
- OS/VS Message Library: VS2 MVS Utilities Messages
- OS/VS Message Library: Mass Storage System Messages
- OS/VS Message Library: VS2 System Messages
- OS/VS Message Library: Linkage Editor and Loader Messages
- OS/VS Message Library: VS2 System Codes
- OS/VS Message Library: BS2 Routing and Descriptor Codes

- IMS/VS Version 1 Messages and Codes Reference Manual
- Mass Storage System Extensions Messages
- OS/VS2 MVS Hierarchical Storage Manager Messages
- EREP Messages
- Network Communications Control Facility Messages
- ACF/VTAM E Messages and Codes
- ACF/VTAM Version 2 Messages and Codes
- ACF/TCAM Version 2 Messages
- OS PL/I Checkout Compiler Messages
- JES 3 Messages
- OS/VS2 MVS RACF Messages and Codes
- TSO Terminal User's Guide
- Information/Library and Library/MVS General Information Manual
- Information/Library and Library MVS Installation and Information-Retrieval Guides

Information/Library contains an online self-story course. This course provides a description of Information/Library with sample dialogs and performance hints.

In addition, an online document, "Hints to Searching Library/MVS," has been provided. To review this document, simply do a little search using "Hints" as your search argument, review the table of contents, and review and/or print the topics of interest.

Information/Library can be used by customer personnel as an online tool for quick reference to formal documentation related to MVS. It is not a substitute for the library of printed manuals, but supplies a readily available master index to these manuals.

The following is a list of the various subsystems, with their release levels, found in Library/MVS at the announcement date. Updates will be provided as they become available.

- ACF/NCP/VS, Version 1
- ACF/TCAM, Version 2
- ACF/VTAM, Version 2
- ACF/VTAME, Release 1
- COBOL, Release 2
- Data Facility Extended Function, Release 1.0
- Data Facility/Data Set Services, Release 1.0
- DB/DC Data Dictionary, Release 3.0
- Document Composition Facility and Document Library Facility, Release 2
- Environmental Recording, Editing and Printing, Release 1.3.0
- Hierarchical Storage Manager, Release 3.1
- Information/Library, Release 1.0
- IMS/VS DBRC, Version 1 Release 2
- IMS/VS, Version 1 Release 2
- JES2, Release 2
- JES3, Release 2
- Mass Storage System, under OS/VS1 Release 6.7 and OS/VS2 MVS Release 3.8

- Mass Storage System E, under OS/VS1 Release 6.7 and OS/VS2 MVS Release 3.8
- Network Communication Control Facility, Release 2
- Network Routing Facility, Release 1
- Network Terminal Option, Releases 1 and 2
- OS/VS2 System Programming Library MVS Release 3.8
- PL/I, Release 4.0
- Resource Access Control Facility, Release 1.4
- Resource Management Facility, Release 2.4.1
- System Network Architecture, Release 1
- TCAM, Release 4 Version 2
- TSO, Release 1.3.0
- TSO/E, Release 1.3.0
- Vector Processing Subsystem/SP, Release 1
- VS/APL, Release 4
- VS FORTRAN, Release 1.1
- VSAM, Under OS/VS2 Release 3.8
- 3800 Printing Subsystem, under OS/VS2 Release 3.8

Information/Library and Library/MVS have been specially designed to provide the data base organization, search, retrieval and support functions required by the highly structured organization of SRLs. The products have been optimized for ease of operation, ease of use and quick results. Data processing professionals and inexperienced personnel should be able to improve the productivity and completeness of their information gathering activities.

Summary of Information/Library II Capabilities

- Context search based on manual-like structure
 - Search on title (including order number)
 - Search on abstract
 - Search on heading
 - Search on index
 - Search on heading and index
 - Search on various combinations of the above
- Text profiling helps determine search result relevance
 - Display of table of contents above a result heading
 - Display of all index terms associated with a result heading
- Word fragment searches
- Dialog capabilities for easy efficient inquiries
 - Small number of comprehensive, yet easy-to-use functions
 - User guidance by fill-in-panels
 - No need to learn any command syntax
 - Extended search terms: phrases and word fragments
 - Search operations based on previously obtained results
- Online tutorial and help facilities
 - Educational panels
 - Help panels, available at any dialog step
- Off-line printing
 - Parts to be printed are user selectable
 - User comments can be added
 - Print information can be directed to specific printers
 - SYSOUT data sets

Information/System II provides a broad spectrum of IBM-supplied planning and corrective information.

A proven productivity aid the Information/System program product is an interactive retrieval facility based on key words for searching data files. It is designed for ease of use by data processing professionals. The IBM Information Network has installed this program product and its data base features in its Tampa computer complex. Since the contents of the files are updated frequently, current information is available.

The data bank contains consolidated technical information for MVS, VM/370, DOS/VSE, or OS/VS1 environments, primarily from IBM support and maintenance locations. These locations provide relevant product information on major IBM programming components. Including operating systems, compilers, assemblers, access methods, DB/DC products, emulators, job entry subsystems, utilities and interactive products. These IBM locations also provide numerous published articles and documents that give additional insight into the proper planning, installation and maintenance of IBM programming and system component products.

Access to this technical material is in the form of abstracts or complete text, including:

- Technical product descriptions of recent IBM Programming announcements
- Technical articles or abstracts produced by IBM support organizations
- Program Temporary Fix (PTF) cover letters and Program Level Change (PLC) Information, plus current status and planning information
- Brief descriptions of, and schedules for, selected educational offerings
- Table of contents with appropriate chapter numbers from selected IBM publications

Summary of Information/System II Capabilities

Information at your service.

Retrieval capabilities have been developed to help support data processing professionals' interest in and their need for different kinds of information.

The Information/System II retrieval program is designed to recognize specific key words that relate to products of interest to the data processing organization. A single key word can be used or multiple key words can be combined using "and," "or," and "not" connectors.

Information/System II gives each user many choices, including the ability to:

- Search all data files or only selected files
- Retrieve full texts or only titles
- Limit a search to the latest file additions
- Browse through adjacent entries
- Print a hard copy of any selected portion of a technical document

Timely, Comprehensive Information

Information/System II is designed with the needs of system programmers in mind. It should help reduce turnaround time in getting answers to technical questions. It helps reduce the overall time DP professionals must spend getting those answers. Information/System II can be a valuable productivity tool every day . . . from planning for the initial installation, through maintaining and tuning specified IBM products, and finally, through transition to the latest releases or replacement products.

IBM Information Network keeps the data files up-to-date for you. The information is stored at the Tampa computer complex and is updated frequently to keep it more current. Obsolete information is removed after a warning period.

Designed for Efficient, Easy Use

Information/System II has been designed with simplicity of use as a primary consideration. An orientation module is provided to teach the first-time user how to operate the system and how to structure search arguments in order to find the desired information. Using a minimal set of commands, a user may retrieve and display the desired data. An interactive HELP file facilitates learning and is designed to show how to make the most efficient use of this product. Glossaries provide alphabetical access to all key words.

Let Us Tell You More

If you would like to attend a demonstration or seminar on Data Bank for DP Professionals or would like to have a marketing representative contact you, write:

IBM Information Network
P.O. Box 30104
Tampa, FL 33630-3104

Or, call IBM toll-free: 800-631-5582.

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INFORMATION NETWORK

Network Management

Product Description

INSURANCE COMMUNICATION SERVICE

The IBM Information Network's Insurance Communication Service is designed to speed and simplify communications between thousands of independent agencies around the country and insurance company home offices.

The new service offers the following capabilities:

- A wide variety of computer terminals, minicomputers and large processors can be attached to the network with protocol conversion capabilities for "bisynchronous" communication;
- Messages from agencies or companies can be delivered immediately or can be stored and later forwarded on either a scheduled or demand basis;
- Agencies and companies can take advantage of advanced store and forward features such as status query, directory services, priority options, and message routing to multiple destinations;
- The service supports the industry transmission standards as well as IBM's "Systems Network Architecture" and "bisynchronous" protocols;
- The network can support custom-designed applications, such as editing routines, developed by insurance companies;
- Companies can communicate between their own locations — among regional, branch, claims and home offices — as well as with other companies;
- Companies can offer "interactive services" to network users, broadcast "news" and provide administrative services;
- Companies and agencies also may connect to the IBM Information Network's Tampa, Florida computing complex to use the more than 100 standard IBM computing programs available there;
- Companies and agencies can use an online problem reporting system and take advantage of a service for managing attachment to the network;
- The network is generally available around the clock, seven days a week.

The Insurance Communication Service meets the requirements for communication between architecturally dissimilar agency computers and terminals located throughout the United States, and insurance companies' computers and terminals. It provides a single, unified network that offers simplified communications at reduced hardware and software costs, as well as faster turnaround for improved customer service.

The IBM Information Network is based on IBM's System Network Architecture (SNA) and uses techniques that enable devices using other protocols to communicate through the network. With this capability, insurance company host computers, many of which use the SNA protocols, will be able to use the Insurance Communication equipment using non-SNA protocols such as "3780" and "3275" bisynchronous protocols.

The IBM Information Network also provides agencies access to the data processing resources of insurance companies as well as the network's Tampa computing center.

Network Access — Communication Methods

Through the network, independent agencies can communicate easily with insurance companies attached to the service, enabling the agencies to do business with a number of carriers

while retaining independence of choice.

For insurance companies, the service provides an existing network with flexibility for growth. This can enable a company to avoid or limit the costs of designing, implementing and operating a proprietary network. The new service accommodates communications among a company's locations as well as with independent agencies nationwide.

Users of the IBM Insurance Communication Service have two basic methods of Communication: "store and forward" and "interactive processing."

Store and forward service permits messages and insurance transactions to be sent immediately to specific users through the IBM Information Network or retained for transmission when requested. Other advanced capabilities such as directing a single message to multiple locations and querying network status will also be available.

Users have the option of sending "store and forward" messages over leased lines or with a "dial-up" connection. With the dial-up option, agencies are able to send and receive a typical day's transaction data from one or more insurance companies during a single telephone connection to the network.

Users can also elect to have the IBM Information Network store data for later retrieval. Long term "archival" storage is also available.

Interactive Processing

With the interactive processing service, the IBM Information Network establishes direct communication between agency computer equipment located anywhere in the U.S. to an insurance company's in-house computer. The network's computers validate authorization and security codes and then link the user's equipment to the company's computer.

The necessary checking of communication line status and other tasks associated with operating complex data processing networks are also handled by the IBM Information Network. This frees users from many network management concerns.

Insurance companies have the option of having their programs installed and running in IBM's Tampa computing center. They may also elect to expand their private networks through the use of the IBM Information Network, giving them a cost-effective alternative for network expansion or to accommodate additional users.

Pilot testing of the "store and forward" is in progress with general availability scheduled for July, 1983.

While the Insurance Communication Service offers functions tailored to the specific needs of the property and liability insurance industry and incorporates industry-developed transmission standards, its basic capabilities are appropriate to other segments of the industry, such as life and health insurance.

Let us tell you more

If you would like to attend a demonstration or seminar on the Insurance Communication Service or would like to have a marketing representative contact you, write:

IBM Information Network

P.O. Box 30104

Tampa, FL 33630-3104

Or, call IBM toll-free: 800-631-5582.

COMPANY HIGHLIGHT

NATIONAL CSS, INC.
187 Danbury Road
Wilton, CT 06897
(203) 762-2511

Robert E. Weissman, Chairman
David S. Fehr, President
Subsidiary of The Dun & Bradstreet
Corporation
Total Employees: 1,750
Total Revenue, Fiscal Year End
12/31/81: \$112,000,000

THE COMPANY

- National CSS, Inc. (NCSS), formed in 1967, markets remote computing services and software products internationally. Since mid-1979 NCSS has operated as a subsidiary of The Dun & Bradstreet Corporation (D&B), reporting to Business Information Services. Its position within D&B is shown in Exhibit A.
- NCSS 1981 revenue was \$112 million, a 15% increase over 1980 revenue of \$97 million. Management estimates that approximately 2% of 1981 revenue was captive.
 - Revenue for 1980 was restated to exclude sales from Zytron Corporation, a former NCSS subsidiary which was established as a separate division of D&B in 1981. Zytron markets computer output microfilm (COM) services and equipment.
 - 1981 operating income for both remote computing services and software products improved significantly over 1980. A large portion of Business Information Service's 54% growth in 1981 operating income has been attributed to NCSS. In 1980 the NCSS operating margin was below the 11% average for the Business Information Group.
 - The discontinuance of the NCSS 3200 minicomputer series, announced in September 1981, was completed by year end. NCSS operating income was negatively affected by anticipated losses incurred by these operations in 1981. The 3200 Series had sustained losses since its inception in 1978, reporting a pre-tax loss of \$10 million in 1980.
- Recent NCSS acquisitions include the following:
 - Multiple Funding Services Inc., headquartered in New York City, was acquired in June 1982. The company will operate as part of the Remote Computer Services Division. Multiple Funding, with 150 clients, markets software packages used for sales support by life insurance representatives.

- On October 7, 1981 Synergetics Corporation of Bedford (MA) was acquired and merged into the Software Products Group. Synergetics specializes in data base support software. Its primary product, DATA CATALOGUE 2, is an information resource management system and data dictionary.
- In February 1981 the NCSS TBS Division was sold to its principal management. TBS provided batch processing services in the New York area, and represented NCSS's sole batch operation.
- NCSS is organized into two operating units:
 - The Remote Computer Services Division (formerly Integrated Systems and Services) provides remote computing services and support.
 - The Software Products Group provides IBM systems software products through NCSS's TSI International Ltd. subsidiary, headquartered in Norwalk (CT).
- NCSS competes with other major remote computing services companies including ADP Network Services, GEISCO, Service Bureau Company, and Tymshare.

KEY PRODUCTS AND SERVICES

- NCSS revenue for 1981 and 1980 by type of service is estimated as follows:

	1981		1980	
	Revenue (\$ millions)	Percent of Total	Revenue (\$ millions)	Percent of Total
Processing services				
• Remote computing*	\$100	89%	\$78	81%
• Batch services	-	-	6	6
Software products	12	11	8	8
Minicomputer systems	-	-	5	5
	\$112	100%	\$97	100%

*Includes some minicomputer systems revenue in 1981

- NCSS processing revenue increased approximately 19% in 1981 to \$100 million, from \$84 million in 1980. Revenue by processing type follows:

NATIONAL CSS, INC.

	1981		1980	
	Revenue (\$ millions)	Percent of Total	Revenue (\$ millions)	Percent of Total
Applications Services (network products developed or licensed by NCSS)	\$70	70%	\$54	64%
Basic Timesharing Services (utility or user software on network service)	30	30	24	29
Batch Services	<u>-</u> \$100	<u>-</u> 100%	<u>6</u> \$84	<u>7</u> 100%

- Over 3,000 clients access the NCSS network. The most widely used product is NOMAD, an internally developed data base management system.
 - NOMAD and NOMAD 2, which generated approximately 35% of 1981 applications services revenue, are accessed by over 2,500 customers.
 - NOMAD 2, an upgraded version of NOMAD, was introduced in May 1980. Features include screen formatting, integrated graphics, array and text data handling, and concurrent data bases.
- NCSS's network applications are concentrated in areas of data management, financial planning, statistics, sciences and engineering, and simulation. Applications introduced during the past two years include:
 - Two accounting systems based on McCormack & Dodge's A/P+ and G/L+ packages, introduced in February 1982. The systems were customized by NCSS for interactive RCS use.
 - CSS/GL+ automates general ledger accounting, providing users with extensive budgeting, modeling, and planning capabilities.
 - CSS/AP+, an accounts payable system, processes contracts and prepaid invoices, tracks cash requirements, handles check printing and registry, and generates 14 different reports.
 - CSS/PLOT, a fully integrated graphics facility available with NOMAD 2 and CSS/FINAL, introduced in February 1982. Features include bar and pie charts, line plots, and scatter-

grams with options for layout, axis types, scaling, and annotation.

- CSS/FINAL, an NCSS-developed integrated financial management system introduced in June 1981. CSS/FINAL provides data management, analytic, and reporting capabilities for financial managers.
 - In April 1982, the CSS/QUOTES+ securities data base was added to CSS/FINAL. The data base provides information on over 42,000 securities, including common and preferred stocks, corporate and government debt instruments, and mutual funds. Over 80 mathematical, time series, and financial functions from CSS/FINAL can be applied to CSS/QUOTES+.
- CSS/RESPOND, an NCSS-developed personnel information system introduced in March 1981. CSS/RESPOND provides employee information collection, analysis, and reporting.
- TextMaster, a text management system with three components: DOCU/MASTER, a data base search and retrieval system; Script/Master, a text processor; and Screen/Master, a screen editor.
- CSS/IMAGE SERVICE, used in conjunction with one of the graphics products, produces charts, graphics, and other images in 35mm slides in color or overhead transparencies.
- A profile of applications available on the network appears in Exhibit B.
- NCSS has jointly developed several services marketed by other D&B organizations, which are available on the NCSS network.
 - D&B Credit Services and NCSS created DunsVue, a service providing credit ratings and summary information via an interactive terminal in the subscriber's office.
 - Fantus' Facilities Location System, the result of a joint development effort between D&B's Fantus Company and NCSS, provides manufacturers with the information needed to determine the most cost-efficient means of transporting raw materials to plants and finished products to warehouses.
 - D&B's Technical Publishing is working with NCSS, Credit Services, and Donnelley Marketing to develop specialized marketing information for selected industries reached by Technical's publications.

- Salesnet, a computerized telephone marketing service for direct sales lead generation, information gathering, and accounts receivable collection, is the result of the combined efforts of NCSS, The Reuben H. Donnelley Corporation, and Duns Marketing Services. Direct sales employees use terminals and video display screens linked to the Salesnet Computer and Telecommunications System, which is linked to the NCSS network.
- Keypoint, an on-line credit service jointly developed by NCSS and D&B Canada, is now available through D&B Canada. The service provides information on 500,000 Canadian businesses.
- D&B International and NCSS offer Management Ratios in the United Kingdom, providing comparative indicators of business performance in 10 major industries in the U.K.
- NCSS announced the Gateway Telecommunications Service in July 1981. Gateway is the name used for external marketing of its telecommunications network. It is being made available for point-to-point communications with or without the use of the NCSS processing center. Access is available from 150 cities nationwide.
- In November 1981 NCSS released an upgraded version of its VP/CSS operating system. Of the 276 routines that comprise VP/CSS, 233 were updated and several new ones were added. Improvements include:
 - Enhanced memory management, allowing users to specify both maximum and minimum dynamic limitations of virtual memory size.
 - An interactive tape catalog facility.
 - Enhanced security, disk, terminal, and spooling-related facilities.
- Effective January 1982, NCSS restructured its pricing for remote computing services. Because of additional expenses involved in supporting smaller users, monthly minimum charges were increased to \$300 and ARUs repriced at 30% and 60% over the base rate for accounts spending less than \$1,600 and less than \$800 per month, respectively.
- Multiple Funding Services, acquired in June 1982, is being integrated into the Remote Computer Services Division. Multiple Funding offers the MUFU Life Insurance Illustration System, a family of software programs providing insurance representatives and financial planners with data analysis necessary for insurance sales and tax planning. Capabilities include estate planning, business valuation analysis, and universal life and multiple policy analysis. Multiple Funding products are available as applications on the NCSS network.

- Some professional services are available in the area of network services for modifying, enhancing, and writing software for network service use.
- NCSS will continue to coordinate software and hardware maintenance for its remaining 3200 Series customers. NCSS provides software support, and, under a four-year agreement signed in April 1981, Four-Phase provides hardware maintenance.
- In 1981 software products revenue was \$12 million, up 50% from \$8 million in 1980. Software revenue for 1981 includes revenue from Synergetics Corporation.
 - Products currently available under the TSI International name are listed in Exhibit C.
 - Products available as a result of the Synergetics acquisition include:
 - DATA CATALOGUE 2, an information resource management system and data/procedures dictionary which operates with a variety of file management and data base systems.
 - Pro/Test, a comprehensive testing package used for testing programs written in any language.
 - Software marketed consists of general monitoring, information retrieval, and program support products, operating on IBM System 360, 370, 43XX, 303X, and equivalent machines.

INDUSTRY MARKETS

- NCSS derived 1981 remote computing revenue from the following industry sectors:

Discrete manufacturing	23%
Process manufacturing	6
Transportation	1
Utilities	23
Banking and finance	5
Insurance	5
Medical	1
Education	1
Retail distribution	1
Wholesale distribution	2
Government	2
Services	20
Other industries	<u>10</u>
	100%

GEOGRAPHIC MARKETS

- Approximately 97% of NCSS 1981 remote computing revenue was derived from the U.S., with 3% from Europe. The following is an approximate distribution of revenue:

New England	19%
Middle Atlantic	41
East North Central	7
South Atlantic	7
West South Central	2
Mountain States	1
Pacific	20
International	<u>3</u>
	100%

- U.S. branch offices are located in Arlington (VA), Atlanta, Bellevue (WA), Cambridge (MA), Charlotte (NC), Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Elizabeth (NJ), West Hartford (CT), Houston, Kansas City, Los Angeles, Minneapolis, Newport Beach (CA), New York City, Norwalk (CT), Philadelphia, Phoenix, Pittsburg, Portland, Rochester (NY), St. Louis, San Diego, San Francisco, Santa Clara (CA), Stamford (CT), Tampa, and Wauwatosa (WI).
- International offices are located in Paris, Stockholm, Sydney, Huchbruckenstrasse (West Germany), and London, Manchester, and Croyden, Surrey (U.K.)

COMPUTER HARDWARE AND SOFTWARE

- The computing center for network services is located in Stamford (CT). The NCSS network consists of 120,000 miles of telephone lines with local dial-up to over 150 cities. Network services to Europe are provided by cable, backed up by satellite. The following equipment is maintained at the data center:
 - 1 IBM 3033, VP/CSS.
 - 1 IBM 3081, VP/CSS.
 - 1 Amdahl 470 V/8, VP/CSS.
 - 38 DEC PDP-11/40s, VP/CSS.
- NCSS centralized its network services as a result of expanded mainframe capacity in Stamford and in order to reduce operating complexities. As of July 1982, processing previously performed at the Sunnyvale (CA) center was moved to Stamford. Sunnyvale will continue to be used as a communications center to link West Coast customers to the network and deliver special services, such as high-speed printing.

EXHIBIT A

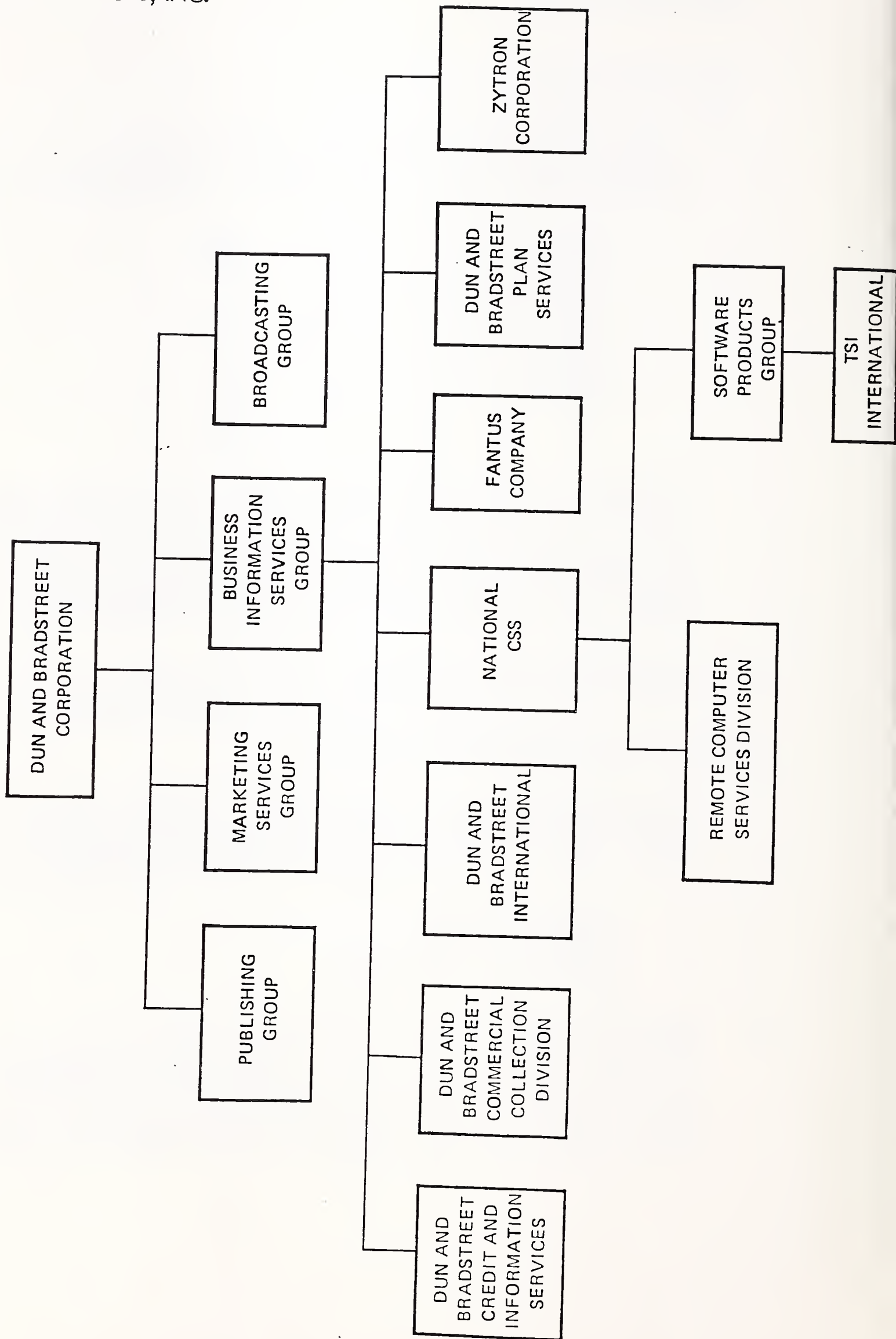


EXHIBIT B

NCSS
RCS NETWORK APPLICATIONS

APPLICATION AREA/PRODUCT NAME

- OPERATING ENVIRONMENT
 - IBM 3033, 3081, VP/CSS
 - AMDAHL 470 V/8, VP/CSS
 - DEC PDP-11/40, VP/CSS
- PROGRAMMING LANGUAGES
 - APL
 - VS BASIC
 - COBOL
 - FORTRAN
 - PL/1
 - RPG-II
 - ASSEMBLER
 - WATFIV
 - PASCAL
- DATA MANAGEMENT SOFTWARE
 - NOMAD
 - NOMAD 2
 - RAMIS II
 - MARK IV
 - TEXT MASTER
 - SCRIPT (TEXT PROCESSING)
- DATA BASES AVAILABLE
 - ON-SITE (CENSUS AND SITE EVALUATION)
 - CENSAC (CENSUS OF HOUSING)
 - TELSTAT (STOCK DATA)
 - MERRILL LYNCH ECONOMICS
 - VALUELINE
 - TRADELINE (SECURITIES)
 - COMMODITY
 - PASSPORT (ECONOMICS AND FINANCE)
 - MARKETBASE (CENSUS DATA)
 - CSS/QUOTES + (SECURITIES)
- FINANCIAL APPLICATIONS/TOOLS
 - INFOTAB (BUSINESS PLANNING)
 - EMS (FINANCIAL MODELING)
 - SPX/TIME (TIME SERIES)
 - LAS (LEASE ANALYSIS)
 - LVB (LEASE VERSUS BUY)
 - BAS (GL, A/R, A/P)
 - CSS/FINAL (FINANCIAL MANAGEMENT)
 - CSS/GL + (GENERAL LEDGER)
 - CSS/AP + (ACCOUNTS PAYABLE)

APPLICATION AREA/PRODUCT NAME

- STATISTICAL MARKET RESEARCH
 - SPX (INTERACTIVE STATISTICAL)
 - SPSS
 - BMD (BIOMED PROGRAMS)
 - SSP (SCIENTIFIC SUBROUTINES)
 - CSS/TAB (QUESTIONNAIRE ANALYSIS)
 - IMAS (MULTIVARIATE ANALYSIS)
- SCIENTIFIC AND ENGINEERING
 - ISPICE (CIRCUIT ANALYSIS)
 - LOGCAP (NETWORK DESIGN)
 - MICROPROCESSOR PROGRAM SUPPORT
 - FLUID FLOW (GASS, GASSUS, LIQSS, LIQT)
 - STRUPAK (STRUCTURAL ANALYSIS)
 - COMPACT (CIRCUIT ANALYSIS)
 - AMPSYN (CAD FOR NETWORKS)
 - FILSYN (FILTER SYNTHESIS)
 - PREDICTOR (FAILURE RATES)
 - ICDS (CIRCUIT DESIGN)
 - PLM/S86 (INTEL 8086)
- SIMULATION
 - DYNAMO (DYNAMIC MODELING)
 - SIMSCRIPT 2.5
 - NGPSS (INTERACTIVE GPSS)
 - MPS 111/OL (LINEAR MODELS)
 - PAUS (RISK ANALYSIS)
- OTHER KEY PRODUCTS
 - PROJECT MANAGEMENT (PMS AND TELOR II)
 - GRAPHICS (DISSPLA AND TELL-A-GRAF)
 - MEMBERSHIP ORGANIZATIONS (CSS MAPS)
 - NOMAD HUMAN RESOURCE MANAGEMENT
 - CSS/IMAGE SERVICE
 - CSS/RESPOND (PERSONNEL)
 - CSS/PLOT
 - MUFU LIFE INSURANCE ILLUSTRATION SYSTEM

COMPANY PROFILE

TYMSHARE INC.

20705 Valley Green Drive
Cupertino, CA 95014

Telephone: (408) 446-6000

Chairman and President: Thomas O'Rourke

Status: Public Company, NYSE

Year Founded: 1966

Fiscal Year End: December 31

PERFORMANCE

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Revenue (\$ millions)	\$ 149.6	\$ 193.1	\$ 235.9	\$ 289.7	\$ 297.0
Percent Growth	48%	29%	22%	23%	3%
Net income (\$ millions)	\$ 10.6	\$ 14.6	\$ 18.7	\$ 15.7	\$ 8.8
Percent growth	26%	33%	18%	(27%)	(45%)

BUSINESS MIX

The 1982 revenue sources were as follows:

<u>Service</u>	<u>Revenue (\$ millions)</u>	<u>Percent</u>
Processing services	\$188	63%
Turnkey systems	10	3%
Professional services	8	3%
Software products	5	2%
Telecommunications services	64	22%
Hardware, maintenance and other	22	7%

GOALS & OBJECTIVES

The short term goal of Tymshare is to find an acquirer, for which Goldman Sacks and Hambrecht Quist have been hired as financial advisors following WANG's withdrawal. Tymshare is also looking to divest business areas with declining revenues while investing in the expansion of the TYMNET network (its biggest asset). Other stated goals include an ill-defined and amorphous "blend of communications and data processing" and "more custom systems," "new software tools (--) for progressive industries." Tymshare believes "we are entering a new timesharing era (--) the third major revolution (--) from raw T/S (1), to specialized value-added applications (2), to the sharing of large integrated systems and services (3)," whatever that means.

CURRENT STRATEGY

The one clear strategy that can be seen is the pursuit of the telecommunications VAN network business which is expanding at 50% per annum and is nearly one-third of the 1983 revenue base. Customized private networks, public packet-switched networks, and personal packet network nodes are some of the key products. Tymshare has the opportunity to become one of the first commercial data carriers to package satellite, microwave, and cable-based communications services that provide telex, terminal and computer interconnect. Outside of the communications area, Tymshare's strategy is confused. It has unsuccessfully dabbled in medical systems, credit card processing, fuel oil processing, and shared automatic teller machine networks. None of these businesses were pursued aggressively. Tymshare has attractions for commercial processing service vendors, specialist transaction service vendors, and communications companies, but has a confusing profile. Two suitors came and went in 1983 (Wang and McAuto). The company can now be had cheaply since there is strong dissatisfaction amongst shareholding management that they were unable to cash in on the McAuto offer.

CAPABILITIES

Tymshare's capabilities are best defined by looking at who its competitors are:

- Remote Computing: GEISCO (General Electric), Business Information Services (CDC), National CSS (Dun & Bradstreet), Automatic Data Processing, Computer Sciences Corporation, and Electronic Data Systems.
- Credit Authorization Services: Telecredit and JBS.
- Accounting/Tax Services: CCH Computax, Computer Language Research (FASTAX), Computer Sciences Corporation, and Reynolds & Reynolds.
- Data Communication Services: GTE Telenet, AT&T, and United Telecom (UNINET).

The full product line available on the processing network and batch service is given in Exhibit A.

The company's financial position continues to erode. In the nine months to September 30, 1983, revenue was \$217.2 million, down from \$231.7 million a year earlier and the net loss of \$139,000 was achieved only after a \$3.8 million tax benefit, compared to a profit in 1982 of \$11.1 million.

Tymshare is not strongly managed and lacks a clean strategy. This has led to some disillusionment in the employee ranks and the loss of good people. The head count on September 30, 1983 was approximately 3,400. Nevertheless, the company continues to increase its network, which for a long time has had to take a back seat in the distribution of investment capital, but that now believes its time has come.

MANAGEMENT

Tom O'Rourke, 65, CEO of Tymshare for 17 years (since inception), ex GE.
Alden Heintz, Vice President, International Operations Group, 15 years with company, ex CDC.
Ron Braniff, Vice President, Computer Services, with company 15 years, ex IBM.
Warren Prince, Vice President, Network Systems, with company 12 years, ex GE, ex President of Call-A-Computer.
Laszlo Rokocz, Vice President, Computer Technology, with company 10 years, former founder of Standard Computing Corporation, ex GE and RCA.
Vince Titolo, Vice President and CFO, joined Tymshare 1980, ex treasurer of Ampex, ex U.S. steel and Chase Manhattan.

Exhibit B is an organization chart of Tymshare's division management.

ASSUMPTIONS OF FIRM

The company's management was preoccupied, until recently, with size rather than profit. This led to a series of acquisitions, many of which have since been discarded and others which remain but should have been sold off. This preoccupation with size at all costs has drained the company of capital and management time and attention it could not afford.

Tymshare would have liked to have been ADP, but lacks the market know-how and management strength to make it happen. Having been a pioneer in timesharing, Tymshare now lags behind in application strength, and salesforce strength. The company could easily become a data communications carrier for the corporate western world at a time when the need for such services is just taking off.

GENERAL CHARACTERISTICS

Tymshare markets its services through a combination of direct sales (equipment product marketing, information network services, professional services, five international sales groups), vertical market subsidiaries (Tymshare transaction services, Telecheck, Tymshare Banking systems) and joint ventures.

The latter have included exclusive marketing agreements with MATRA of France (Scanset), turnkey systems with Timberline Systems Inc. (Professional Accounting Systems), and high-speed software downloading systems jointly developed by Tymshare and Software Inc. of San Francisco. This is Tymshare's entree into the software retail market and the system is intended to feed off of the TYMNET network, connected to IBM PCs exploiting a data base of available software programs. Tymshare hopes to bring the service to Europe rapidly.

Tymshare's unique capability is its network and worldwide coverage. Its remote computing services are not unique nor especially competitive.

ACQUISITIONS (Since January 1982)

Multi-point Communications Corporation, a provider of multipoint distribution services in the Chicago area, was acquired in early 1982. Multi-point owned and operated a microwave transmission station that distributes Reuters Financial Information and Showtime pay TV signals.

Travel Systems Inc., of Austin (TX) was acquired in March 1982. Travel Systems marketed a fully integrated, standalone accounting system for travel agencies. It was merged into Tymshare's Travel Management Services, an organization established last year after the acquisition of ITT Electronic Travel Services.

DMI Systems Inc. of Lyndhurst (NJ), a closely-held supplier of financial data processing systems. DMI had 1982 revenue of \$4 million.

Acquired a majority ownership (80%) of FTC Communications, Inc., one of the five largest international record carriers, during 1983, pending FCC approval. FTC Industries will retain the remaining 20%. FTC will be combined with TYMNET, enabling Tymshare to participate in the electronic messaging marketplace providing telex, teletext, and other services.

DIVESTITURES

Tymshare's fuel oil processing business was sold in 1981 to a group of investors.

Marketing and development activities on MANUFACTS, a turnkey system for manufacturers, have been cancelled.

OPTION, an automatic teller machine pilot network program in Southern California, was terminated after two years in development.

Tymshare sold its Medical Systems Division to McDonnell Douglas Automation (MCAUTO) in April 1982 for an estimated \$7 to \$8 million. Annual revenue of the division was about \$15 million.

In October 1982 a portion of Tymshare's Transaction Services Division, the credit card processing segment acquired in 1977, was sold to its largest competitor, First Data Resources, an American Express subsidiary. For the first nine months in 1982, credit card processing revenue was \$19 million. American Express purchased the operation for an estimated \$9 to \$10 million.

RECENT OFFERING ANNOUNCEMENTS

October 1983 - MAGNUM , Tymshare's relational data base management system, now available as a software product for user in-house use.

- Offering 2400 bps asynchronous dial-up support for low-cost modems on TYMNET.

- The Swedish Telecommunications Administration awarded \$3 million contract to Tymshare for a major expansion of the DATAPAK packet-switched network. The contract calls for installation of nine TYMNET Engine communication processors and five ISIS/MXP systems.
- Tymshare and FTC Communications announced the inauguration of two-way messaging between Tymshare's OnTyme electronic message service and FTCC's international telex gateway.

September 1983 - Tymnet supplied the Chase Manhattan Bank with the first phase of a private communications network which will interconnect bank operations in New York with London, Paris, Geneva, Bahrain, Panama City, Singapore, Hong Kong, and Jakarta.

August 1983 - Announced an asset management system, Mechanized Inventory Tracking System (MITS), designed to track, control, analyze, and report on capital assets. Available as a software product (starting at \$50,000) on IBM and plug-compatible systems, or as a processing service.

August 1983 - Tymshare added a 1,200 bit/sec model to its line of Scanset terminals, priced at \$1,295.

September 1983 - Announcing a new version of its OnTyme electronic mail system that uses non-technical English language instructions. OnTyme has over 10,000 worldwide users and is accessed via TYMNET.

February 1983 - Announced an expansion program of TYMNET to extend its public packet data communications network from an additional 150 U.S. cities. More than 400 cities will have local access to TYMNET by mid-year (extending services to most locations with populations of 85,000 or greater).

November 1982 - A new service option, TYMSLICE, was introduced, permitting a customer to have sole access to a portion of one of Tymshare's large mainframe computers at a fixed monthly charge.

November 1982 - Tymshare announced its offering of microcomputer-based services, integrating microcomputer-based applications software with data base and remote computing services access to TYMNET.

- Using DEC Rainbow 100 series and Professional 300 series microcomputers, users initially will be provided business applications for information management, financial modeling and analysis, data entry, and word processing.

May 1983 - Announced a service, Financial Institution Communications System (FICS), as an application of OnTyme electronic message network service to correspondent banks.

EXHIBIT A

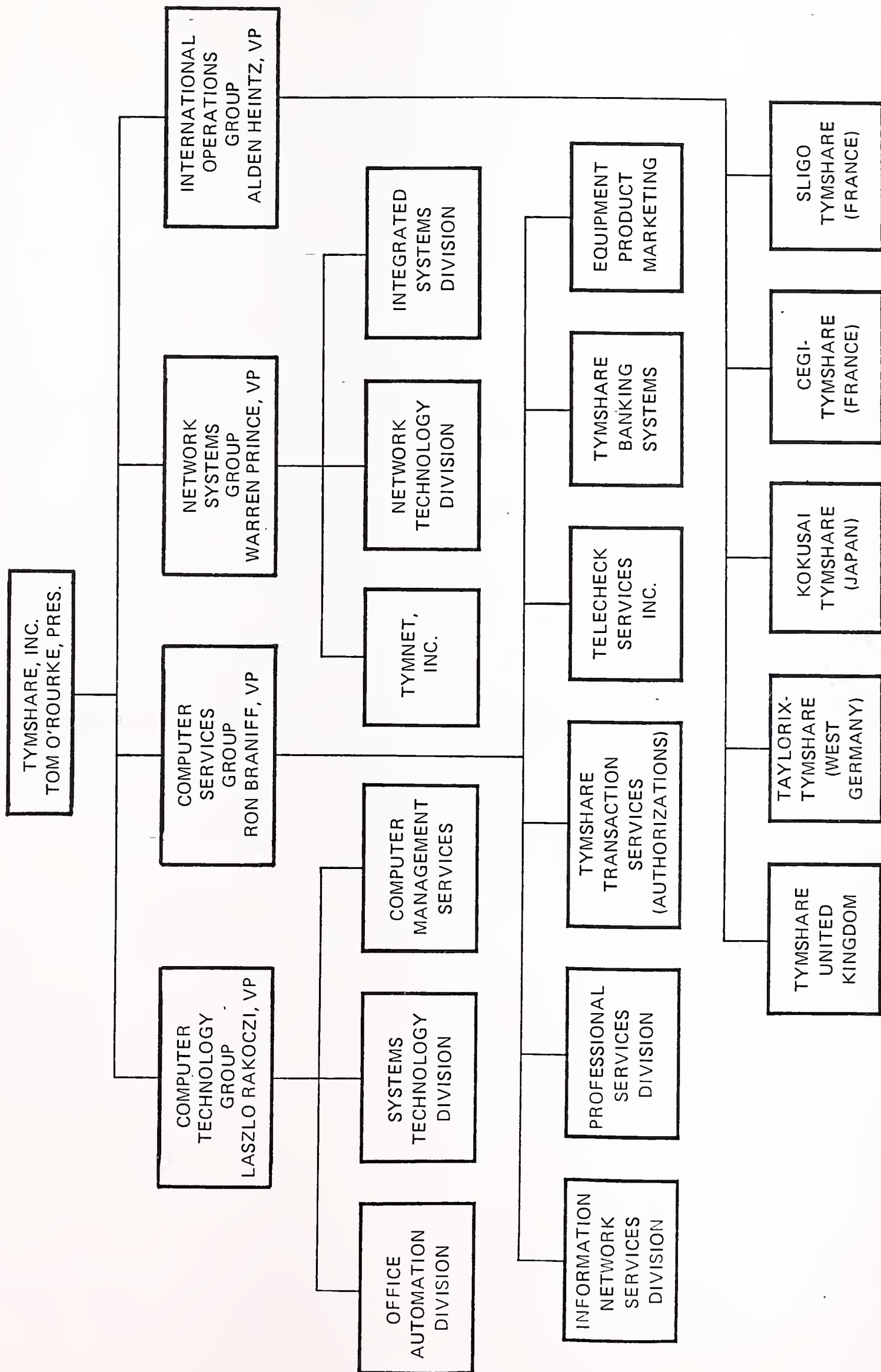
APPLICATIONS AVAILABLE ON TYMSHARE'S RCS NETWORK AND BATCH SERVICE BUREAUS

APPLICATION AREA/PRODUCT NAME
<ul style="list-style-type: none"> ● OPERATING ENVIRONMENT <ul style="list-style-type: none"> -- IBM 370/3033, VM/CMS -- AMDAHL V6, VM/CMS -- XEROX 940s, TYMCOM IX -- DEC SYSTEM 10, TYMCOM X ● DISTRIBUTED PROCESSING CAPABILITIES <ul style="list-style-type: none"> -- TYMSHARE MODEL 1100 INTELLIGENT TERMINAL -- IBIS -- TYMSHARE SYSTEM XX ● PROGRAMMING LANGUAGES SUPPORTED <ul style="list-style-type: none"> -- APL -- COBOL -- ASSEMBLY -- FORTRAN -- BASIC -- PL/1 ● DATA MANAGEMENT SOFTWARE <ul style="list-style-type: none"> -- FOCUS -- RETRIEVE -- IML -- SYSTEM 1022 -- MAGNUM -- SYSTEM 2000 ● DATA BASES AVAILABLE <ul style="list-style-type: none"> -- TYMQUOTE SECURITIES DATA -- CITIBASE TIME SERIES DATA BANK -- SITE II DEMOGRAPHIC DATA (1980 CENSUS) -- DWIGHTLINE (PETROLEUM) ● FINANCIAL APPLICATIONS/TOOLS <ul style="list-style-type: none"> -- BASIC BUSINESS LANGUAGE (BBL) -- EXPRESS -- FINPACK (FINANCIAL ANALYSIS) -- TYMTAB (FINANCIAL MODELING) -- FINSYSTEM (PERSONAL FINANCIAL PLANNING) ● SCIENTIFIC AND ENGINEERING <ul style="list-style-type: none"> -- GPSS -- STRESS -- MACE -- ANVIL 4000 -- MSINC -- SPICE -- NATIONAL SEMICONDUCTOR LIBRARY -- TI MICROPROCESSOR SUPPORT

APPLICATION AREA/PRODUCT NAME
<ul style="list-style-type: none"> ● MANAGEMENT SERVICES <ul style="list-style-type: none"> -- CASH MANAGEMENT -- BUDGET PLANNING AND ANALYSIS -- PERSONNEL (PERS) -- PROJECT MANAGEMENT (CRAM) -- EARNINGS RECORD (ERS) -- RAIL FLEET MANAGEMENT (RAILTRACK) ● ACCOUNTANTS/TAX SERVICES <ul style="list-style-type: none"> -- GENERAL LEDGER (FRS) -- TIME REPORTING AND BILLING (TRS) -- DYNATAX, UNITAX, DELTATAX, AUTOTAX, ESTAX ● BANKING APPLICATIONS <ul style="list-style-type: none"> -- INTERNATIONAL BANK INFORMATION SYSTEM (IBIS) -- CREDIT CARD PROCESSING -- MUNICIPAL BONDS (BONDBID) -- CREDIT ANALYSIS (SPREAD) -- LOAN ACTIVITY TRACKING -- FIXED ASSET ACCOUNTING -- ASSET LIABILITY PLANNING (ALPS) -- LEVERAGE LEASE ANALYSIS (LEVER) ● OTHER INDUSTRY SPECIFIC APPLICATIONS <ul style="list-style-type: none"> -- TELEPHONE INDUSTRY -- CABLE TV ACCOUNTING -- TRAVEL SERVICES -- UTILITY LOAD ANALYSIS SYSTEM ● OTHER KEY PRODUCTS <ul style="list-style-type: none"> -- STATISTICAL SAMPLING -- SURVEY -- STATPAK -- AUGMENT -- DISSPLA -- TELL-A-GRAF -- EASY PLOT -- ONTYME (ELECTRONIC MAIL) -- UMIS (MAINTENANCE SCHEDULING)

EXHIBIT B

TYMSHARE ORGANIZATION



APPENDIX C: FIELD SERVICE PERSONNEL SALARIES AND
JOB DESCRIPTIONS

FIELD SERVICE PERSONNEL COMPENSATION SURVEY

FALL 1983 UPDATE

Summary of Salaries for the 22 Technical Jobs

<u>Benchmark Job Number</u>	<u>Title</u>	<u>Average Annual Salary Paid, 06/30/83</u>	<u>Percent Change Since 06/30/82</u>
S041	Branch or Area Manager	\$32,341	7.8%
S044	Field Manager	30,608	14.2
S047	Senior Technical Specialist	31,393	7.4
S049	Technical Specialist	29,690	7.9
S055	Field Service Specialist	30,583	11.5
S056	Engineer-in-Charge	26,414	6.1
S058	Senior Field Service Representative	25,723	9.8
S060	Field Service Representative	21,705	6.5
S062	Associate Field Service Representative	18,125	8.4
S064	Field Service Trainee	16,081	9.8
S066	Dispatcher (Centralized)	12,834	4.4
S067	Clerical Dispatcher	14,158	8.6
S068	Technical Dispatcher	19,248	18.9
S070	Repair Center Manager	31,230	7.9
S072	Senior Repair Technician	22,053	4.2
S074	Repair Technician	18,704	4.7
S076	Associate Repair Technician	16,204	7.0
S080	Senior Instructor	30,863	12.5
S082	Instructor	26,639	10.2
S084	Associate Instructor	23,744	13.1
S090	Senior Technical Service Planning Specialist	32,260	8.1
S092	Technical Service Planning Specialist	28,607	4.6
	Average	\$24,509	8.8%

NATIONAL MANAGER

Benchmark Job Number S008

DUTIES:

- ☐ Direct an organization with responsibility to provide total customer support nationwide.
- ☐ Review, formulate, recommend, and implement policies, procedures, practices, and organizational resource allocations for substantial growth and profitability.
- ☐ Establish and communicate goals and objectives that contribute to product line promotion.
- ☐ Establish national operating budget and capital expenditure plans. Control expenditure and monitor revenues.
- ☐ Organize and structure field operations and select, develop, evaluate, and reward key personnel to ensure high levels of productivity.
- ☐ Direct the establishment and maintenance of training programs for field personnel.
- ☐ Review and analyze division operations and performance, and institute necessary changes to ensure productivity and control costs.
- ☐ Ensure customer satisfaction and quality service.
- ☐ Interface and coordinate efforts with sales and marketing areas.
- ☐ Typically has profit and loss responsibility.
- ☐ This position would report to the Top Field Service Executive, but in a smaller company may be the senior job in field service.

DIRECTOR LOGISTICS

Benchmark Job Number S011

DUTIES:

- ☐ Under the direction of the Top Field Service Executive or National Manager (or in some cases may report to the top job in technical services), maintain optimum levels of spare parts inventory.
- ☐ Establish and maintain efficient field depots.
- ☐ Implement current inventory control systems to gain parts usage and failure rate information, as well as forecast spare parts requirements on vendors in accordance with agreed-upon lead times.
- ☐ Ensure parts and equipment repair and/or refurbishing.
- ☐ Prepare and operate within the approved logistic operation expense budget.
- ☐ Prepare activity reports for supervisors.
- ☐ Maintain a program of departmental training.
- ☐ This is the top logistics job in the field service organization.

DIRECTOR HEADQUARTERS OPERATIONS AND ADMINISTRATION

Benchmark Job Number S014

DUTIES:

- ☐ Under the direction of the Top Field Service Executive or National Manager, direct the preparation, review, and approval of annual and long range business plans and budgets for service centers.
- ☐ Identify data elements needed for performance measurement and management analysis.
- ☐ Assist in development of business plans, policies, procedures, reports, and forms.
- ☐ Represent field service in development of data-based reporting systems under the jurisdiction of other departments.
- ☐ Ensure systems relative to billing contract compliance for out-of-warranty maintenance agreements, factory repairs, and special service situations are developed and maintained on an ongoing basis.
- ☐ Collect, prepare, and analyze data to publish operating and financial analyses to assist operations management in business planning, control, and evaluation.
- ☐ Prepare comparative analysis of performance at different service centers.
- ☐ Provide interface with marketing for competitive analysis and pricing.

This position may also provide for administrative support to field service for such activities as the distribution of payroll checks, expense account processing, control of travel advances, lease car administration, etc. It may also be responsible to collect, prepare, and analyze data to publish operating and financial analyses to assist operations management in business planning, control, and evaluation.

DIRECTOR TECHNICAL SERVICES

Benchmark Job Number S017

DUTIES:

- ☐ Under the direction of the Top Field Service Executive or National Manager, develop field service strategic plans and service objectives consistent with corporate goals; plan and develop operating budgets for department activities; develop logistics and material plans and systems to support installed equipment population.
- ☐ Serve as interface between field service organization, R&D, hardware/software engineering, and manufacturing to develop life cycle costing, ensure serviceability, determine test equipment needs, etc.; review product design and modifications to assure serviceability.
- ☐ Track equipment performance in the field to identify problems and recommend modifications to improve reliability and/or serviceability.
- ☐ Resolve customer relations problems by working with internal employees as required.
- ☐ Ensure availability of adequate technical support resources at headquarters.
- ☐ Develop and improve upon employee training programs.

MANAGER LOGISTICS

Benchmark Job Number S022

DUTIES:

- ☐ Under the direction of the Director Logistics or Director Technical Services, maintain an effective tracking system for field service equipment either being shipped to customers or returned for repair, the determination of the disposition of equipment, and the tracking of customer service inventory throughout various regions.
- ☐ Responsible for disposition of defective material being returned for repair from the customer and the regional office.
- ☐ Expedite priority shipment orders and closures based on inputs from regional managers and/or customers.
- ☐ Control and track customer service inventory swapped out by field service representatives, and provide information to the appropriate personnel.
- ☐ Interface with customers to improve and/or clarify language on contracts relative to repair, return, shipping, and billing.

MANAGER PRODUCT SUPPORT

Benchmark Job Number S025

DUTIES:

- ☐ Under the guidance of the Director Technical Services, develop and implement programs, procedures, and policies for assuring a highly efficient technical support staff to provide direct technical support to field service employees.
- ☐ Organize and train technical specialists and schedule optimal use of downtime.
- ☐ Implement programs to upgrade technical proficiency of field personnel via seminars, technical bulletins, etc.
- ☐ Provide feedback on product performance and field personnel to management, quality assurance, and engineering.
- ☐ Recommend improvement programs.
- ☐ Evaluate effectiveness of maintenance strategies, diagnostics, test equipment, space, etc.
- ☐ Assist with installation of new products.
- ☐ Support marketing with business shows and demonstrations.
- ☐ Provide advisory support to all levels of field management on equipment and customer problems.

MANAGER TECHNICAL SERVICE PLANNING

Benchmark Job Number S028

DUTIES:

- ☐ Under the general supervision of the Director Technical Services, direct the development of maintenance philosophy, service strategy, and related plans for the eventual field service of new products while they are in development.
- ☐ Interface with engineering to influence serviceability maintainability, and reliability of new products.
- ☐ Analyze performance specifications of new products to estimate service costs, manning requirements, spares requirements and concepts, etc., for input to pricing and business planning.
- ☐ Participates with engineering in the definition of requirements for diagnostics, reference manuals, documentation, tools and test equipment, etc.
- ☐ Provides technical input for curricula development for field engineering training.
- ☐ Interfaces with marketing to ensure that estimated product performance and maintenance strategy/philosophy meet customer/market requirements.
- ☐ Interfaces with quality assurance and field support to evaluate product quality, product performance, field service proficiency, etc., to recommend action for improvement.
- ☐ Develop maintenance plans for products, including financial analyses.
- ☐ Develop test equipment specifications to be used by service representatives and technical specialists.

MANAGER SERVICE TRAINING

Benchmark Job Number S031

DUTIES:

- ☐ Under the general supervision of Director Technical Services, plan, develop, and coordinate product training programs for field support personnel.
- ☐ Obtain information needed to prepare training programs; prepare training materials; develop course content; determine teaching methodology; and coordinate the development of training aids.
- ☐ Conduct training sessions and develop criteria for evaluating effectiveness of training activities.
- ☐ Continuously revise lesson plans to meet new training requirements and to keep technical information up to date.

REGIONAL* MANAGER

Benchmark Job Number S035

DUTIES:

- ☐ Under the guidance of the National Manager, develop plans, programs, budgets, and operating procedures for the region and ensure their implementation.
- ☐ Provide customers with prompt and effective installation and service support maintenance, both preventive and remedial.
- ☐ Responsible for efficient scheduling and allocation of human and capital resource within the region.
- ☐ Select, hire, develop, and evaluate senior personnel within the region.
- ☐ Select sites for regional and district service office facilities and act as interface with lease facility management and the corporation.
- ☐ Typically has profit and loss responsibility.

*A region is a major subdivision of a nation; typically, there may be three to six regions in the United States.

DISTRICT* MANAGER

Benchmark Job Number S038

DUTIES:

- ☐ Under the direction of the Regional Manager, direct and manage activities of all field engineering personnel within a service district.
- ☐ Plan all service, including installation and maintenance.
- ☐ Monitor the technical reporting system to ensure timely and accurate reporting of all work within the district.
- ☐ Responsible for inventory ordering, control, and capital assets.
- ☐ Administer capital revenue and expense budgets and monitor all business expenses incurred by subordinates. Recruit, train and appraise performance of subordinates.

*A district is a subdivision of a region; typically, there may be two to six districts in a region in the United States.

BRANCH OR AREA MANAGER

Benchmark Job Number S041

DUTIES:

- ☐ Under the supervision of the District Manager, organize and structure the assigned field engineering function within a prescribed geographical area and select, develop, evaluate, and reward subordinate personnel to ensure a high level of productivity and the best use of individual and group capabilities.
- ☐ Monitor deviations from approved budgets to control costs.
- ☐ Appraise each subordinate's performance.
- ☐ Has revenue responsibility.

Use modifiers to define the scope of the Branch or Area Managers jobs as follows:

Use a "C" modifier if revenues are in the \$500K-\$1M range and the number of employees is up to 20.

Use a "B" modifier if revenues are in the \$1M-\$2M range and the number of employees is in the range of 20-40.

Use an "A" modifier if revenues are over \$2M and the number of employees is over 40.

FIELD MANAGER

Benchmark Job Number S044

DUTIES:

- ☐ Under the supervision of a District, Branch, or Area Manager, set priorities for service actions and dispatch field engineering personnel accordingly.
- ☐ Establish preventive maintenance schedules.
- ☐ Recommend purchase and/or allocation of recommended test equipment.
- ☐ Advise on salary increases for subordinates and new hire salaries.
- ☐ Approve field engineers' expense reports, time sheets, and service reports.
- ☐ Responsible for all administrative work in service area.

Use modifiers to define the scope of the Field Manager's job as follows:

Use a "C" modifier if Field Manager is a work leader.

Use a "B" modifier if Field Manager is a supervisor.

Use an "A" modifier if revenues are up to \$500K and the number of employees is more than 10.

SENIOR TECHNICAL SPECIALIST

Benchmark Job Number S047

DUTIES:

- ☐ Under direction, analyze performance of assigned systems and recommend programs to upgrade their performance.
- ☐ Serve as the top technical specialist for the field.
- ☐ Investigate design problems.
- ☐ Interface between field service personnel and headquarters or product specialists.
- ☐ Coordinate both local and corporate resources in resolving technical, software, and/or mechanical problems.
- ☐ Give diagnostics aid by telephone to service representatives when problems cannot be solved locally.
- ☐ Make selected field service calls, in high priority situations, when problems cannot be resolved by phone.
- ☐ May provide on-the-job training to technical specialists, service representatives, and customers on new products.
- ☐ Recommend programs to improve proficiency of field service personnel in assigned area of responsibility.

TECHNICAL SPECIALIST

Benchmark Job Number S049

DUTIES:

- ☐ Under management direction, analyze performance of assigned systems and recommend programs to upgrade their performance.
- ☐ Investigate design problems.
- ☐ Interface between field service personnel and headquarters or product specialists.
- ☐ Coordinate both local and corporate resources in resolving technical and/or mechanical problems.
- ☐ Give diagnostic aid by telephone to service representatives when problems cannot be solved locally.
- ☐ May make field service calls, in high priority situations, when problems cannot be resolved by phone.
- ☐ May provide on-the-job training to service representatives and customers on new products.
- ☐ Seek guidance on difficult problems from Senior Service Representative or Field Service Representative.

FIELD SERVICE SPECIALIST

Benchmark Job Number S055

DUTIES:

- ☐ Under the supervision of the Branch or Field Manager, define hardware and software problems.
- ☐ Provide technical support for undefined system problems to service personnel by telephone or on site.
- ☐ Supply field service representatives with technical information, troubleshooting, repairing, and resolving existing technical problems.
- ☐ Diagnose difficult equipment problems and repair on site when beyond the capability of field service representatives.
- ☐ Oversee service representatives to implement complex and large scale equipment installations.
- ☐ May write technical bulletins for personnel.
- ☐ Assist in training new hires and in ongoing training programs.
- ☐ The incumbent may be exempt or nonexempt.

ENGINEER-IN-CHARGE

Benchmark Job Number S056

DUTIES:

- ☐ Under the general direction of the Field Manager, perform expert demand maintenance on a wide variety of equipment.
- ☐ Has responsibility for the orderly functioning of a single site supported by two or more technical personnel.
- ☐ Responsible for effective work direction, scheduling, and/or technical support of assigned personnel.
- ☐ Responsible for timely submission of required reports and maintenance schedule development and implementation.
- ☐ Ensure personnel have equipment needed to maintain site.
- ☐ Typically requires a minimum of four to six years' work experience performing preventive and demand maintenance and developing a broad base of multiple systems maintenance capability.
- ☐ Must maintain a high level of customer satisfaction.
- ☐ Provide first level technical support to junior personnel.
- ☐ This is a "hands-on" job with lead responsibility; typically nonexempt.

SENIOR FIELD SERVICE REPRESENTATIVE

Benchmark Job Number S058

DUTIES:

- ☐ Under the general direction of the Field Manager, perform expert demand maintenance on a wide variety of equipment.
- ☐ Develop and maintain a high level of customer satisfaction and improved customer relations.
- ☐ Responsible for effective work direction, scheduling, and/or technical support of less experienced personnel.
- ☐ Typically requires a minimum of four to six years' work experience performing preventive and demand maintenance, and developing a broad base of multiple systems maintenance capability.
- ☐ Requires a high degree of customer relations skills.
- ☐ Provide first level technical support for junior personnel.
- ☐ May act as work leader for junior personnel.
- ☐ Typically nonexempt.

FIELD SERVICE REPRESENTATIVE

Benchmark Job Number S060

DUTIES:

- ☐ Under the direction of the Field Manager, provide customer service by analyzing and evaluating equipment performance within his/her area of responsibility.
- ☐ Provide technical support to less experienced technicians and perform direct maintenance as required where unresolved complex equipment problems exist.
- ☐ Typically requires a minimum of three to four years' work experience.
- ☐ Requires a thorough knowledge of multiple types of systems.
- ☐ Must demonstrate a capability for analyzing, evaluating, and diagnosing extremely complex equipment problems in a minimum period of time.
- ☐ Requires a high degree of human and customer relations skills.
- ☐ This is a journey level job.

ASSOCIATE FIELD SERVICE REPRESENTATIVE

Benchmark Job Number S062

DUTIES:

- ☐ Under supervision, perform general preventive and demand maintenance of equipment, developing maintenance techniques and system knowledge.
- ☐ Install and deinstall systems and subsystems, and implement engineering field changes.
- ☐ Establish and maintain effective customer relations and seek to achieve a high level of customer satisfaction.
- ☐ Typically requires a minimum of six months' to one year's work experience performing preventive and demand maintenance, receiving formal and on-the-job training, and developing and maintaining effective customer relationships.

FIELD SERVICE TRAINEE

Benchmark Job Number S064

DUTIES:

- ☐ Under direct supervision, learn preventive maintenance procedures and demand maintenance techniques for equipment, through on-the-job training, formal classroom instruction, and self-study.
- ☐ Contribute to the productive effort of the work group by assisting in the installation of equipment, performing preventive maintenance, and resolving less complex remedial problems.
- ☐ Learn company policies and procedures, and establish good customer relations.
- ☐ Typically requires a minimum of two years' advanced technical training in electronic and mechanical principles, or the equivalent in military electro-mechanical training and maintenance experience.

DISPATCH (Centralized)

Benchmark Job Number S066

DUTIES:

- ☐ Under supervision, at a centralized location, log incoming service calls, record necessary information, and notify appropriate field service representative.
- ☐ Maintain accurate and updated customer file (manually or through an automated system), including records of installations, deinstallations, and service calls.

This dispatching function is normally centralized and covers the entire U.S. See job S067 if your job dispatches on a more regionalized basis.

CLERICAL DISPATCHER

Benchmark Job Number S067

DUTIES:

- ☐ Under supervision, log incoming service calls, record necessary information, and notify appropriate field service representative.
- ☐ Maintain accurate and updated customer file, including records of installations, deinstallations, and service calls.
- ☐ Keep local Manager advised on matters relating to equipment and customer problems.
- ☐ May prepare reports on response time, number of calls, and part usages as required.
- ☐ May perform related office duties, such as typing and filing.

Dispatching may be done at the local, district, or regional level:

Use a "C" modifier if your Dispatcher is at the local level.

Use a "B" modifier if your Dispatcher is at the district level.

Use an "A" modifier if your Dispatcher is at the regional level.

If you have the dispatching function at more than one level, report all jobs separately by attaching additional copies of this page. See Job S066 if your dispatching is centralized on a national basis. See Job S068 if your dispatching job had technical duties as well.

TECHNICAL DISPATCHER

Benchmark Job Number S068

DUTIES:

- ☐ Under general supervision, log incoming service calls, record necessary information, and notify appropriate field service representative.
- ☐ Discuss equipment problems with customer to identify type of malfunction; assist field service representative on site with diagnosis of problem and identification of corrective action.
- ☐ Maintain accurate and updated customer file, including records of installations, deinstallations, and service calls.
- ☐ Keep local manager advised on matters relating to equipment and customer problems.
- ☐ May prepare reports on response time, number of calls, and part usages as required.
- ☐ Typically, this job is filled by a former field service representative.

Dispatching may be done at the local, district, or regional level:

Use a "C" modifier if your Dispatcher is at the local level.

Use a "B" modifier if your Dispatcher is at the district level.

Use an "A" modifier if your Dispatcher is at the regional level.

If you have the dispatching function at more than one level, report all jobs separately by attaching additional copies of this page. See Job S066 if your dispatching is centralized on a national basis.

REPAIR CENTER MANAGER

Benchmark Job Number S070

DUTIES:

- ☐ Under direction of higher management, organize and structure the assigned repair center function to ensure a high level of productivity and supervise the assigned repair technicians.
- ☐ Responsible for in-center repair and service of the total product line including: warranty repairs, billable service repairs, inventory and sale of parts and accessories.
- ☐ Collect and report failure analysis information.
- ☐ May assist in establishing the financial goal for the repair center operation, and monitor deviation from approved expenditure to control cost.

Use modifiers to define the scope of the Repair Center Manager's job as follows:

Use a "C" modifier if Repair Center Manager is a work leader.

Use a "B" modifier if Repair Center Manager is an exempt supervisor.

Use an "A" modifier if Repair Center Manager has profit-and-loss responsibility.

SENIOR REPAIR TECHNICIAN

Benchmark Job Number S072

DUTIES:

- ☐ Under general direction, typically in a repair center, analyze, troubleshoot, and repair complex technical problems of broad product line of standard equipment or components, or on complex products where understanding of the total instruments is required to ensure complete repair or "state-of-the-art" products where high level technical skills are demanded.
- ☐ May train and give work direction to other technicians.
- ☐ Assist on quality assurance and other technical matters.
- ☐ Prepare diagnostic quotations or estimates on repairs based on established guidelines and inform customers of this estimate.
- ☐ Initiate request for necessary supplies and support materials.
- ☐ Maintain associated records.
- ☐ May act as work leader for junior personnel.
- ☐ Typically nonexempt.
- ☐ This is *not* a manufacturing job.

REPAIR TECHNICIAN

Benchmark Job Number S074

DUTIES:

- ☐ Under direction, typically in a repair center, analyze, troubleshoot, make repairs, and resolve technical problems on equipment or components returned to repair centers from customers.
- ☐ Prepare diagnostic quotes or estimates on repairs based on established guidelines.
- ☐ Initiate request for necessary supplies and support materials.
- ☐ Maintain associated records.
- ☐ May provide limited work direction to other technicians.
- ☐ May perform other duties, such as mechanical repair and cleaning of products, and shipping and receiving functions.
- ☐ May assist with quality assurance and other technical matters.
- ☐ This is a journey level job.
- ☐ This is *not* a manufacturing job.

ASSOCIATE REPAIR TECHNICIAN

Benchmark Job Number S076

DUTIES:

- ☐ Under supervision, analyze, troubleshoot, and repair equipment or components in a repair center with the aid of written documents.
- ☐ Provide information about equipment malfunction, estimated repair cost, and time needed for repair.
- ☐ Initiate requests for necessary supplies and materials.
- ☐ Maintain associated records.
- ☐ May perform other duties, such as mechanical repair and cleaning of products, delivery of products, and shipping and receiving functions.
- ☐ Typically requires six months' to one year's experience.
- ☐ This is *not* a manufacturing job.

SENIOR INSTRUCTOR

Benchmark Job Number S080

DUTIES:

- ☐ Under general direction, responsible for development and implementation of programs, procedures and curricula for all formal technical training of field service personnel from trainees to specialists within assigned product areas.
- ☐ Coordinate class and laboratory schedules to ensure the appropriate mix of theory and hands-on instruction.
- ☐ Schedule and conduct instructor training and improvement programs.
- ☐ Requires a very high level of technical competence.
- ☐ Instruction typically requires about 40-60% of incumbent's time.

INSTRUCTOR

Benchmark Job Number S082

DUTIES:

- ☐ Under general supervision provide formal test technical instruction and practical laboratory training to field engineering trainees and representatives assigned in the operation, maintenance, and repairs of the assigned products in accordance with established course guidelines and objectives.
- ☐ Evaluate performance of trainees and, within fairly broad limits, modify course content or pace to ensure trainees meet course objectives.
- ☐ Develop and implement curricula which will ensure trainees learn how products operate, how to perform scheduled product maintenance, and diagnose trouble and make repairs.
- ☐ May act as lead instructor and assist in training new instructors.
- ☐ Requires a very high level of technical competence.
- ☐ Instruction typically requires about 50-75% of incumbent's time.

ASSOCIATE INSTRUCTOR

Benchmark Job Number S084

DUTIES:

- ☐ Under general supervision, provide formal technical instruction and practical laboratory training to field engineering trainees assigned to the operation, maintenance, and repair of the assigned products in accordance with established course guidelines and objectives.
- ☐ Evaluate performance of trainees and, within established limits, modifies course content or pace to fit level and program of the class.
- ☐ May recommend course modifications.
- ☐ Requires a high level of technical competence.
- ☐ Instructing typically requires 75-90% of incumbent's time.

SENIOR TECHNICAL SERVICE PLANNING SPECIALIST

Benchmark Job Number S090

DUTIES:

- ☐ Under general direction, represent field service to engineering and manufacturing; participate in new product design reviews; develop and implement maintenance program for new products.
- ☐ Assist in development of maintenance pricing concepts and strategies for new products.
- ☐ Analyze competitive maintenance methods, practices, and prices.
- ☐ Establish new product requirements for equipment, spares, and recommend maintenance manpower requirements and pricings.

TECHNICAL SERVICE PLANNING SPECIALIST

Benchmark Job Number S092

DUTIES:

- ☐ Under general direction, develop and assist in implementation of maintenance program for new products.
- ☐ Develop familiarity with new products by working with designers during design and development phase of a new product.
- ☐ Establish new product requirements for test equipment, spares, and recommend maintenance manpower requirements; define level of training required.



**SALARY INFORMATION RETRIEVAL SYSTEMS
FIELD SERVICE PERSONNEL COMPENSATION SURVEY**

CITY	NUMBER OF COMPANIES	NUMBER OF INCUMBENTS	BASE SALARY	----- MINIMUM	SALARY RANGE MIDPOINT	----- MAXIMUM	TOTAL COMP
ATLANTA	26	133	16,125	14,011	17,455	20,900	16,467
BALTIMORE	19	82	16,648	14,374	17,888	21,401	16,704
BOSTON	30	254	16,968	14,484	17,970	21,457	17,422
CHICAGO	29	295	16,346	14,209	17,508	20,807	16,618
CIN/CLEVE/COLUMBUS	29	218	16,361	14,203	17,574	20,946	16,624
DALLAS	26	181	16,082	13,980	17,271	20,563	16,458
DENVER	21	74	16,480	14,284	17,839	21,394	16,657
DETROIT	25	137	16,537	14,545	18,062	21,579	16,804
HARTFORD	18	50	16,546	14,524	18,114	21,703	16,606
HOUSTON	27	118	16,534	14,267	17,913	21,559	16,848
KANSAS CITY (MO)	20	83	15,998	14,208	17,760	21,311	16,422
LOS ANGELES	30	246	16,249	14,234	17,599	20,963	16,578
MIAMI	22	58	16,436	14,214	17,668	21,122	16,728
MINNEAPOLIS/ST PAUL	20	110	16,922	14,354	17,960	21,565	17,241
SOUTHERN NEW JERSEY	17	95	16,616	14,371	17,973	21,575	16,681
NEW YORK CITY & SUBS	32	341	17,136	14,535	18,001	21,467	17,529
ORANGE COUNTY (CA)	18	74	16,269	14,037	17,584	21,131	16,755
PHILADELPHIA	25	102	16,362	14,301	17,824	21,346	16,716
PHOENIX	20	53	17,024	14,193	17,797	21,402	17,409
PITTSBURGH	27	77	16,358	14,310	17,500	20,690	16,432
PORTLAND (OR)	13	31	16,715	14,348	18,100	21,851	16,715
RAL-DURHAM/CHARLOTTE	22	100	16,369	14,039	17,390	20,740	16,821
ST LOUIS	21	87	16,568	14,281	17,726	21,170	16,820
SAN ANTONIO	15	34	16,150	14,076	17,598	21,121	16,257
SAN DIEGO	18	45	17,410	14,701	18,459	22,218	17,477
SAN FRANCISCO	27	122	16,923	14,388	17,771	21,153	17,286
SANTA CLARA	16	82	16,834	14,531	18,255	21,979	17,144
SEATTLE	26	103	16,613	14,339	17,814	21,290	16,836
WASHINGTON DC	25	126	15,961	14,077	17,436	20,794	16,423
ALASKA	9	5	18,502	14,190	17,833	21,475	18,502
HAWAII	12	20	16,970	14,101	17,513	20,925	17,151
PUERTO RICO	9	9	16,980	14,275	18,125	21,976	16,980
CANADA	11	44	15,954	14,024	17,553	21,082	16,624

